

EMS Integration Project

Final Report

September 2002



This report was prepared by Ross & Associates Environmental Consulting, Ltd under the guidance of the EMS Integration Project Workgroup. The Association of Metropolitan Sewerage Agencies (AMSA) and the Water Environment Federation (WEF) sponsored the EMS Integration Project.

The document was developed under cooperative agreement No. CP82905101-0 awarded by the United States Environmental Protection Agency (EPA). EPA made comments and suggestions on the document to improve its scientific analysis and technical accuracy. These comments are included in the report. The views expressed in this document are those of the Project Workgroup. EPA does not endorse any products or commercial services mentioned in the report.

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1. INTRODUCTION AND BACKGROUND

The Water Environment Federation (WEF), the Association of Metropolitan Sewerage Agencies (AMSA), and the U.S. Environmental Protection Agency (EPA) initiated a project to develop recommendations on a comprehensive management system for water and wastewater utilities, to improve management practices and outcomes in environmental, financial, and other aspects of utility operation. This report describes the process and results of the project.

The project sponsors are aware that the variety of management programs, tools, and systems available to managers of water and wastewater utilities are not fully understood nor utilized. The goal of this project was to help develop a “roadmap” that would assist utility managers understand the different programs, tools, and systems, how they might interrelate, how they might be used to meet utility objectives, and how they might effectively nest within the framework of a continual improvement management system, such as an environmental management system (EMS).

The objectives at the outset of this project were the following.

- Identify and document the successful use of EMS and other utility management tools in the United States and other countries that can be useful components of a comprehensive EMS.
- Identify barriers to integrating these programs and tools into a utility-wide EMS.
- Identify methods (such as delivery mechanisms) that would facilitate the integration of these programs and tools into a utility-wide EMS.
- Identify incentives that would motivate utilities currently implementing worthwhile programs and tools to integrate them into an overall EMS.
- Develop recommendations and guidance on the development and implementation of comprehensive EMS by public water and wastewater utilities incorporating all of the above.

Readers should note that the Workgroup findings described in this report reflect that the Workgroup has concluded that it is both feasible and desirable to consider and integrate the management initiatives that were reviewed in the context of a continual improvement management system framework. The International Organization of Standards (ISO) 14001 voluntary EMS, the National Biosolids Partnership voluntary EMS Program, and the ISO 9002 voluntary quality assurance system are examples of three such continual improvement frameworks. The Workgroup believes that these management system frameworks provide a well-established and proven continual improvement management approach, based on the conceptually simple “plan, do, check, act” process.

Furthermore, the Workgroup believes that, because drinking water and wastewater utility operations are primarily focused on environmental and public health impacts, EMS are a natural starting point for introducing a continual improvement management system into a utility.

1.2 Background

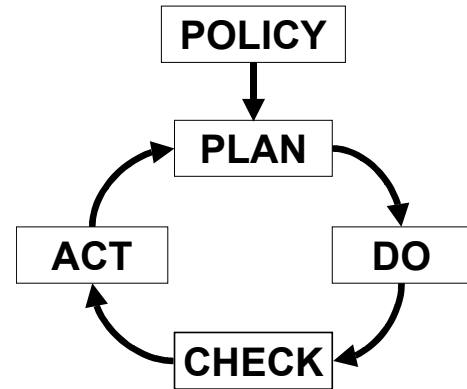
1.2.1 What is an EMS?

An environmental management system (EMS) is an organizational approach to managing environmental impacts. An EMS provides a set of standard procedures and steps – a structured framework - designed to support continual improvement in environmental management. An EMS

is based on the principles of total quality management, originating in the private sector. The EMS approach is now being embraced by all types of organizations around the world, including public sector organizations.

An EMS is built around the “plan-do-check-act” cycle - a total quality management concept - and includes five basic components, which provide the basic framework for continual improvement.

- Policy - Establishment of an environmental policy that sets direction and vision.
- Plan - Identification of environmental impacts and legal and other requirements. Establishment of environmental performance goals and objectives, performance metrics and targets, and plans for addressing environmental impacts.
- Do - Implementation of operational and administrative procedures, policies, and practices. Establishment of roles and responsibilities.
- Check - Implementation of techniques for measuring against goals/targets, audit processes, reporting formats and procedures, and nonconformance and corrective / preventive actions.
- Act - Implementation of management review procedures, improvement plans, and adjustments (to goals, to procedures, to metrics, etc.).



With an EMS, an organization evaluates and develops processes and procedures to identify and manage the environmental impacts of its organization. An organization looks at selected operations associated with those impacts and makes them visible, measurable, manageable, and therefore subject to improvement. An EMS does not impose new technical requirements. Rather, it helps an organization develop its own short and long-term environmental goals and objectives, its own operational controls, and its own improvement requirements. The EMS may lead an organization to adopt new methods, modify existing ones, or accept the practices it already has in place.

In addition to EMS, there are a number of continual improvement management system frameworks, based on the “plan, do, check, act” cycle, that focus on other management outcomes besides environmental impacts. For this project, the Workgroup looked at a number of such management system frameworks. For example, ISO 9000 is a continual improvement management system framework that focuses on management of quality outcomes. The OSHA Voluntary Protection program is a continual improvement management system framework that focuses on management of occupational safety and health outcomes.

Organizations, including water and wastewater utilities, are adopting continual improvement management systems for a variety of reasons. Drivers identified by utility managers interviewed for this project included the need for: implementing more efficient and consistent means to improve productivity (optimize performance); improving service across the entire scope of operations, identifying and implementing best practices; and engendering teamwork and staff development.

1.2.2 Trends in Public Utility Adoption of EMS

In recent years, public utilities and local governments in the United States and abroad have begun adopting environmental management systems. Close to one-dozen U.S. public utilities have adopted and been certified to the ISO 14001 EMS standard. Roughly 40 wastewater utilities are currently in the process of implementing an EMS under the National Biosolids Partnership's EMS for Biosolids Program. As well, close to two-dozen local government agencies are implementing EMS as part of EPA's EMS for Local Government Initiative. These numbers indicate that more public utilities and local governments are aware of and interested in the adoption of an EMS to manage environmental impacts and performance.

According to the ISO Survey of ISO 9000 and ISO 14000 Certificates (11th Cycle, ending December 31 2001), 36,765 ISO 14001 certifications were awarded internationally in 2001. Although the number of organizations achieving certification has grown rapidly in the U.S. over the past five years to a total of 1,645, European countries and Japan are leading in adoption of EMS. Of the ISO 14001 certifications awarded in 2001, roughly 50% were awarded in Europe (18,243) and 22% in Japan (8,123). However, even in those leading countries, EMS adoption by public utilities is a small, but growing segment.¹

1.3 Project Workgroup

To meet the project objectives, the project sponsors recruited an EMS Integration Project Workgroup (Workgroup) comprised of nine drinking water and wastewater utility representatives from across the country with experience in implementing EMS and other management programs. The Workgroup also included four ex-officio advisors.

The project Workgroup began by identifying existing or developing utility management initiatives both within and outside of the United States. The Workgroup then spent several months reviewing, characterizing, and looking for opportunities to make connections among the variety of performance improvement initiatives currently available to and promoted for use by drinking water and wastewater utilities. The initiatives examined include formal programs such as QualServe and the Partnership for Safe Water, guidance documents such as the AMSA Asset Management Handbook, voluntary standards such as ISO 14001, and regulatory requirements such as GASB-34. Additionally, a series of interviews were conducted with utility managers throughout the United States and abroad to discuss their experience with one or a combination of the initiatives.

Over the course of the project, the Workgroup had two face-to-face meetings (for a total of 20 hours) and connected by conference call on three occasions to discuss the research findings and develop consensus and focused recommendations regarding the feasibility and desirability of integrating the various performance improvement initiatives in the context of an environmental management system (EMS) framework.

1.4 Executive Summary of Findings and Recommendations

The Workgroup has concluded that it is both feasible and desirable to consider and integrate those management initiatives that were reviewed in the context of a continual improvement

¹ All information in this paragraph from "The ISO Survey of ISO 9000 and ISO 1400 Certificates Eleventh Cycle: up to and including 31 December 2001" available at <http://www.iso.org>.

management system framework. The ISO 14001 voluntary environmental management system, the NBP voluntary EMS Program, and the ISO 9002 voluntary quality assurance system are three such continual improvement frameworks. The Workgroup believes that these management system frameworks provide a well-established and proven continual improvement management approach, based on the conceptually simple “plan, do, check, act” process. Utilities’ experience with continual improvement management system frameworks indicates they can offer distinct advantages over conventional utility management efforts, which do not typically include the routine assessment of business practices and changes needed to support continual improvement.

Benefits associated with the management system frameworks, as indicated by the interviews with utility managers, include:

- continual improvement in environmental, financial, and other management outcomes;
- greater operational consistency and reliability;
- improved teamwork and interdepartmental coordination; and
- critical customer responsiveness and recognition.

Furthermore, the Workgroup believes that, because drinking water and wastewater utility operations are primarily focused on environmental and public health impacts, environmental management systems are a natural starting point for introducing a continual improvement management system into a utility.

The Workgroup has drawn these conclusions from the following findings.

1. There is a need to provide utility managers with clearer direction on the interrelationship of the many management initiatives and to identify appropriate strategies for best combining these initiatives to meet utility objectives. The interviews conducted for this project indicated that the initiatives have provided utility managers with substantial benefits. At the same time, utility managers are left with a sense of “initiative overload” and have found it difficult to discern how the initiatives interrelate and to identify opportunities to use them in an integrated, systematic way to improve utility performance. This appears to inhibit adoption and/or limit value when utility managers view or implement the initiatives in a piecemeal fashion.
2. For purposes of better understanding the relationships among the management initiatives, the Workgroup loosely grouped them into two categories: **management tools** that provide specific and concrete direction on and methods for selecting performance levels, best practices, and/or appropriate policies and procedures; and **management system frameworks** that emphasize a “plan, do, check, act” continual improvement approach.
 - a. The **management tools** researched for this project provide a nearly complete set of improvement “building blocks”, providing specific and concrete direction for selecting performance levels, best practices, and/or appropriate policies and procedures. Many of the management tools researched are specifically tailored for water and/or wastewater utilities. However, the tools, for the most part, are not designed to address specifically how a utility manager can organize and direct internal resources to support the implementation of performance improvements consistently and effectively. Moreover, the management tools do not focus on continual improvement of performance, nor do they provide a framework for addressing a broad range of management outcomes.

- b. The **management system frameworks** examined for this effort are structurally very similar. They use a consistent set of management elements that support continual improvement through a “plan, do, check, act” approach to organizing, directing, and adjusting internal resources. Each is also designed to address impacts from the organization’s operations that go beyond legal compliance. They do not, for the most part, prescribe performance levels or specific management practices, but rather allow utility managers to make these decisions based on an overall assessment of impacts, legal requirements, and interests of outside parties. Each is also designed to ensure that the management system leads to continual improvement of performance at a pace consistent with the organization’s overall goals and can serve as a way of addressing a broad range of management outcomes and integrating the use of various management tools.
3. The Workgroup found that the management tools and system frameworks examined overlap quite substantially, covering individually or in combination the entire drinking water, wastewater treatment, and stormwater value chains (processes).² The tools and frameworks further combine to address all major management outcomes (those high-level performance areas which utility managers must balance and manage), to which utilities typically direct attention and resources: financial health; product, process, and service quality; environmental, health, and safety impacts; and human resources.
4. The Workgroup found that utilizing the management tools in the context of a management system framework embeds the best practices and performance objectives in a proven approach that can aid consistency and effectiveness of implementation. The tools and management system frameworks reviewed during this project are naturally and highly complementary. Properly combined, the initiatives can provide utility managers with a complete management package geared to improving performance. The management system frameworks provide an effective means to integrate the various tools to support improved utility management. Although an EMS is a natural starting point for water and wastewater utilities, any one of the management system frameworks examined can be utilized to put in place the core of a “plan, do, check, act” continual improvement management system. The management tools can supplement the management system frameworks by providing concrete planning methods and guidance on best practices, procedures, and performance levels. The management tools can help a utility manager tailor the more general management system frameworks to the utility and reduce the burden of adopting a continual improvement management system.

This report further discusses these four findings in detail and explores the concept of an EMS-based integration of the management initiatives available to or required for use by utilities. This integration approach reflects and accommodates the individual management system frameworks and indicates how the various tools can “nest” within the system to support either its development or on-going implementation. The approach also indicates to utility managers how, as desired, they can use the management initiatives to provide management system building blocks, and how they can leverage implementation of the initiatives into a broader overall utility management effort. Information is also present that supports phased implementation, thereby equipping a utility

² The drinking water value chain includes: source/intake control; disinfection; sediment removal and filtration; corrosion control and fluoridation; and distribution systems. The wastewater treatment value chain includes: wastewater collection, stormwater, and pretreatment; wastewater treatment and solids generation; polishing and effluent discharge; solids stabilization, conditioning, and handling; and biosolids transportation and disposition.

manner to vary the scope (i.e., the management outcomes, such as environmental impacts or financial health covered), breadth (i.e., the operational units covered), depth (i.e., the organizational level addressed), and pace of management system implementation.

The report concludes with a set of suggested next steps. The Workgroup believes that the EMS integration concept can act as a supplement to existing initiatives and provide a means to nest and leverage the initiatives more effectively. Unique to this concept is the fact that it does not require the development of a formal program. Rather, the Workgroup believes that this report will provide utility managers with needed clarity about the interrelationship of these management tools and frameworks.

2. WORKGROUP RESEARCH AND FINDINGS

2.1 Management Initiatives Researched

At the project outset, the Workgroup identified and profiled a wide variety of utility management tools and management system frameworks available to and promoted for adoption by drinking water and wastewater utilities. These management initiatives are designed to improve organizational performance (either overall performance or that in specific sub-program areas). These management initiatives included the following (a summary of each initiative is provided in Appendix D):

- AMSA Asset Management Handbook – “Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance”
- American Public Works Association (APWA) Management Accreditation Program
- American Water Works Association (AWWA) Proposed Accreditation Program
- Bid-to-Goal
- Balanced Scorecard
- Capacity, Management, Operation and Maintenance Programs (CMOM)
- EPA EMS for Local Government Initiative
- Governmental Accounting Standards Board Statement #34 (GASB-34)
- International Organization for Standardization (ISO) 14001 – EMS Standard
- ISO 9002 - Quality Management System Standard
- Malcolm Baldrige National Quality Award
- National Biosolids Partnership (NBP) EMS for Biosolids
- Occupational Safety and Health Agency (OHSA) Voluntary Protection Program
- Partnership for Safe Water
- QualServe

For purposes of better understanding the relationships among these management initiatives, the Workgroup loosely placed them into two categories: 1) **management tools** that provide specific and concrete direction on and methods for selecting performance levels, best practices, and/or appropriate policies and procedures; and 2) **management system frameworks** that emphasize a “plan, do, check, act” continual improvement approach. (Note that some of these initiatives are associated with formal programs while others take the form of guidance documents, voluntary standards, management methods, or regulatory requirements.)

Table 1: Management Tools and Management System Frameworks Researched

Management Tools	Management System Frameworks
<i>Provide:</i> Direction on selecting performance levels, best practices, and/or appropriate policies and procedures	<i>Provide:</i> Continual improvement approach, based on “plan, do, check, act”
<ul style="list-style-type: none"> • AMSA Asset Management Handbook (guidance) • APWA Management Accreditation Program (program) • AWWA Proposed Accreditation Program³ (program) • Bid-to-Goal (method) • Balanced Scorecard (method) • CMOM (regulatory requirement)⁴ • GASB-34 (regulatory requirement) • Malcolm Baldrige National Quality Program (award program) • NBP EMS for Biosolids⁵ (program) • Partnership for Safe Water (program) • QualServe (program) 	<ul style="list-style-type: none"> • EPA EMS for Local Government Initiative (program) • ISO 14001 – EMS Standard (voluntary standard) • ISO 9002 - Quality Management System Standard (voluntary standard) • NBP EMS for Biosolids (program) • OSHA Voluntary Protection Program (program)

2.1.1 Management Tools

The management tools, in general, are designed to provide utilities with specific information about performance levels, best practices, and/or appropriate policies and procedures. Most of the tools examined are specifically tailored for water and/or wastewater utilities. The tools, for the most part, however, do not address how a utility manager can organize and direct internal resources to support their implementation consistently and effectively.

Some examples of the tools and the direction they can provide include the following.

- The Partnership for Safe Water provides specific performance levels for drinking water turbidity that an organization can adopt.
- QualServe provides an approach for assessing the utilization of best practices.
- The NBP EMS for Biosolids Program (through the use of the National Manual of Good Practice for Biosolids) and the APWA Management Accreditation Program identify specific best practices for use by water and/or wastewater utilities.
- Balanced Scorecard provides a strategic planning methodology for establishing overall management strategic vision, goals, and objectives.

³ The AWWA Proposed Accreditation Program and CMOM were included in the Workgroup’s research, but are still under development.

⁴ CMOM is currently only required in EPA Region 4, but may, in the future, be a national requirement.

⁵ The NBP EMS for Biosolids Program appears in both columns because it provides a “plan, do, check, act” based management system framework and a national guidance manual on good practices for biosolids.

2.1.2 Management System Frameworks

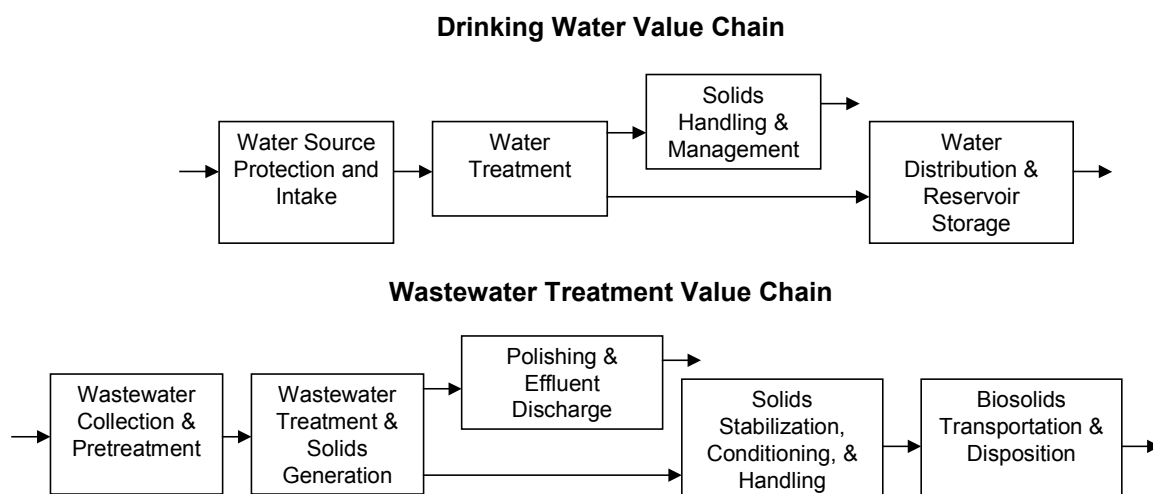
The Workgroup found that the management system frameworks are structurally very similar. They use a consistent set of management elements that support continual improvement through a “plan, do, check, act” approach for organizing, directing, and adjusting internal resources. Each is also designed to address impacts from the organization’s operations that go beyond legal compliance. They do not, for the most part, prescribe performance levels or specific management practices, but rather allow utility managers to make these decisions based on overall assessment of impacts, legal requirements, and interests of outside parties. Each is also designed to ensure that the management system leads to continual improvement of performance at a pace consistent with the organization’s overall goals. These management system frameworks typically focus on a single outcome of utility management (e.g., environmental impacts or product quality).

2.1.3 Scope of Management Initiatives

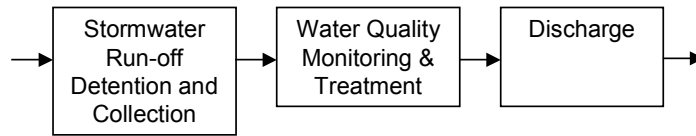
In order to understand how the various management initiatives might interrelate, the Workgroup looked for a way to understand the commonalities and differences among them. The Workgroup found two ways to look at the commonalities and differences. First, they looked at how each initiative aligned with the drinking water, wastewater treatment, and stormwater value chains (see diagrams below). Second, the Workgroup examined which high-level management outcome(s) each management initiative supported. The management outcomes – those areas for which a utility must typically balance and manage – identified by the Workgroup include:

- Impacts/Risks – e.g., environmental impacts, occupational health and safety, public health and safety;
- Quality – e.g., process, products, or service;
- Financials – e.g., costs, capital assets, customer rates; and
- Human Resources – e.g., employees, skill base, training.

The Workgroup found that the initiatives overlap quite substantially, covering individually or in combination all parts of the drinking water, wastewater treatment, and stormwater value chains (e.g., all business processes from collection/intake to distribution/output – see diagrams below). As well, the initiatives address, either individually or in combination, all of the major utility management outcomes.



Stormwater Value Chain



2.2 The Need for an Integration Approach

Through a series of interviews conducted with utility managers using or familiar with one or more of the management initiatives, the Workgroup identified many examples indicating that the initiatives have proved beneficial. At the same time, the interviews indicated that utility managers are experiencing a sense of “initiative overload” and have a lack of clarity about how the different initiatives interrelate and how they could best be used, either individually or in combination, to meet utility objectives.

Initiative participation levels collected by the Workgroup indicate that even the most successful initiatives are reaching only a small portion of utilities nation-wide. Of the thousands of water and wastewater utilities nationwide, the following are approximate numbers of participants in the programs researched: 250 for Partnership for Safe Water; 40 for NBP EMS Program; 90 for QualServe; 9 accredited for APWA Management Accreditation, with 16 applications for accreditation; and 23 for EMS for Local Government Initiative. These numbers reinforced the belief that “initiative overload”, as well as lack of clarity of how initiatives interrelate, could be inhibiting utility managers from fully utilizing the available initiatives. It also lead the Workgroup to believe that it would be useful to provide utility mangers with guidance on how these many initiatives interrelate and to identify appropriate strategies and approaches for best using them in combination to meet utility objectives.

The Workgroup members also observed that it is common for management improvement initiatives to be implemented consecutively with little explanation or understanding among the staff about how the initiatives relate to one another or can leverage gains realized. This leads to a relatively high level of skepticism and a perspective that managers are pursuing a “flavor of the month” approach to improvement efforts. A consistent philosophy or system, based upon repeatable elements such as the “plan, do, check, act” cycle, can help to connect the initiatives and build a sustainable program.

3. AN APPROACH TO INTEGRATION

3.1 The Continual Improvement Management System Framework Components

In looking across the different management system frameworks – ISO 14001, ISO 9002, OSHA Voluntary Protection Program, NBP EMS for Biosolids, and EPA EMS for Local Government Initiative - the Workgroup found substantial consistency among their components and underlying logic. Each of the management system frameworks researched has four high-level components: Plan, Do, Check, and Act. As well, each of the four components of the management system frameworks includes a series of more detailed elements. The Workgroup also found substantial similarity among the management system frameworks’ elements. The four components and their associated elements are described further below.

3.1.1 “Plan” Component

The purpose of the planning component and its elements is to: develop a policy statement that is driven by and consistent with the organization’s overall mission and vision; select management outcomes that are consistent with the policy statement; identify legal requirements and other voluntary commitments (across selected outcome areas); establish goals and targets (in selected outcome areas); and establish metrics for measuring performance against selected goals and targets. The orientation of the planning elements will differ by the management outcome(s) selected. For example, in a continual improvement management system focusing on environmental outcomes, the policy statement, legal and other requirements, and goals and targets will be oriented around management of environmental impacts. Alternatively, in a continual improvement management system focusing on quality outcomes, the planning elements will be oriented around quality management.

3.1.2 “Do” or Implementation Component

The purpose of the “do” or implementation component is to align operational and administrative practices, procedures, and processes; organizational structure, roles, and responsibilities; communications programs (internal and external); employee training programs; and emergency procedures with the policy, goals, and targets established during planning.

As the Workgroup confirmed via the interviews, many of the implementation elements cover activities that utilities will typically conduct as part of conventional management efforts. For example, utilities typically have employee training programs in place. They may cover on-the-job safety issues and/or include operator certification. However, incorporation into a continual improvement management system typically requires that the training program is explicitly integrated with other management system elements and tied to goals and objectives. Additionally, continual improvement management system frameworks typically drive a greater degree of process and procedural standardization and documentation than may have existed under a conventional management approach.

The management outcome(s) selected will determine the exact nature of the implementation component elements. For example, in a continual improvement management system focusing on environmental outcomes, the training program and other implementation elements will be oriented around management of environmental impacts. Alternatively, in a continual improvement management system focusing on quality outcomes, the training program and other implementation elements will be oriented around quality management.

3.1.3 “Check” Component

The purpose of the check component is to align procedures and processes for the regular, ongoing monitoring of organizational performance with the policy, goals, and targets established during planning. The check component includes elements designed to establish and align: techniques for measuring performance and progress against goals and objectives; management system audit procedures; performance reporting formats and procedures; and management system nonconformances and corrective / preventive actions for addressing nonconformances.

3.1.4 “Act” Component

The purpose of the act component is to establish and align procedures and processes for making regular, ongoing improvements to operations and the management system. The elements of the

act component include: regular management reviews; improvement plans; and system adjustments. Acting is based upon the data and evaluations generating in the checking stage of the cycle.

3.2 Types of Management System Elements

Each of the continual improvement management system frameworks researched include a series of elements that fall under each of the four components (plan, do, check, act). The number of elements varies between the different management system frameworks (for example the NBP's EMS for Biosolids has 17 elements). However, when looking across the management system frameworks, there is a high degree of similarity in the type of elements present. The outline of continual improvement management system framework elements provided in Appendix C contains elements that are derived from those found in the different management system frameworks researched.

The elements of the management system frameworks tend to be of two types: “core elements” – those that are always present and remain consistent irrespective of the management outcome(s) addressed, and “support elements” - those that are utilized and/or tailored depending on the management outcome(s) selected.

3.2.1 Core Elements

The management system elements associated with checking and acting tend to be highly consistent, irrespective of the specific management outcomes at which they are directed. This consistency among the frameworks sets up an opportunity to leverage readily the implementation of one framework, such as ISO 14001, to address additional management outcomes covered by other frameworks. For example, once an organization establishes management review procedures (an element of the acting component), associated with ISO 14001 and directed at environmental impacts, the same review procedures can fully support implementing ISO 9002 directed at quality outcomes. The procedures and timing associated with the management review could remain unchanged, while the scope of operations and performance indicators examined during the review would be expanded.

3.2.2 Support Elements

The management system elements associated with planning and doing (or implementation) are typically tailored to fit different management outcomes. Their orientation will be different for different outcomes (e.g., they may require different planning analytical methods and may impact different functional units of the organization). For example, the operational procedures, processes, and practices designed to manage environmental impacts could be altogether different from those targeted at improving financial performance.

3.3 Leveraging the Commonality Among the Management System Frameworks for an Integration Approach

Because each of the management system frameworks puts in place a set of core elements and all four components (plan, do, check, act) of a continual improvement management system, the Workgroup concluded that an opportunity exists to use any one of them to introduce a continual improvement management system framework to a utility. The four management system components provide the basic structure of a continual improvement management system that can

be tailored to fit any or all of the management outcomes (e.g., impact/risk, quality, financials, and human resources).

Once introduced, any one of the management system frameworks can be leveraged to address additional management outcomes through adjustments or additions to the support elements, while keeping the core elements fundamentally intact. For example, the management system framework based on ISO 14001, which focuses on environmental outcomes, can be leveraged to address quality and/or health and safety management areas as reflected in ISO 9002 and in the OSHA Voluntary Protection Program. The checking and acting elements such as management review or internal audit can be easily modified to include an expanded scope. Management review or internal audit procedures can be applied without change. The timing, frequency, and roles/responsibilities can remain unchanged, but their scope could be expanded to include multiple management outcomes.

As well, any of the management system frameworks can be used as the basis to integrate effectively the utility management tools as desired/needed. The Workgroup has found that the existing tools provide an approach for the development or ongoing implementation of one or several of the support elements of a management system framework. The tools can play a critical role in helping a utility manager specifically tailor the continual improvement management system to the utility.

The tools play an important role by helping the utility determine where the need for improvement exists and how improvement can be made by providing concrete planning methods and concrete guidance on best practices, procedures, and performance levels, all of which a utility must establish to ensure the continual improvement management system is firmly grounded in better performance. The existence of the tools can substantially lower the burden of introducing a continual improvement management system into a utility, as best practices, procedures, and performance levels can be drawn from the tools, rather than invented by each utility from scratch. At the same time, linking the utilization of any one of the tools to a continual improvement management system imbeds the best practices and performance objectives in a proven approach that can aide consistency and effectiveness of implementation.

Some utilities are using a phased approach that begins with the implementation of a continual improvement management system with a single management outcome focus, such as ISO 14001, and expanding to include other management outcomes as described above. However, utility managers could just as easily make (and some are) management change by utilizing one of the tools that support utility planning, such as QualServe. Using either approach, the project research and discussions indicate that utility managers can use the management initiatives to provide components of a continual improvement management system. As well, the initiatives can be leveraged by integration with other initiatives to move the utility in the direction of a continual improvement management system framework.

Integrating the management system frameworks and tools, in effect, provides the utility with a complete management package. Using any one of the management system frameworks can provide the backbone for integrating the tools and management system frameworks and provide a structure into which the desired combination of initiatives can nest. This supports leveraging and integrating any of the variety of management initiatives to provide water and wastewater utilities with an approach for organizing, directing, and adjusting internal resources to achieve performance improvements and good management practices. As well, utilization of the integration approach further positions a utility to become certified simultaneously, as desired, to any one of a number of utility management initiatives.

3.4 How the Continual Improvement Management System Frameworks Differ from Conventional Utility Management Approaches

The interviews indicated that there are a variety of ways that the use of a continual improvement management system framework is different from conventional management approaches. One of the clearest differences is that a continual improvement management system will establish an ongoing, regular cycle of checking and acting. In a conventional utility management approach, some form of planning and doing will usually exist. However, the cycle of planning, which includes setting goals and objectives, may not always be followed by a systemic, regular cycle of measuring performance and progress against those goals and objectives (part of checking). As well, although most utilities already do planning and implementation, a “plan, do, check, act” management system will typically drive increased standardization and documentation (such as the increased standardization and documentation of operating procedures). The ability to change in response to changing circumstances is provided for in the checking and acting portions of the cycle and thus, increased standardization does not mean inflexibility.

With the implementation of a management system framework, a cultural shift will occur in the organization in that routine assessment of business practices and changes needed for improvement becomes a regular part of doing business. Typically, there will also be more detail in planning and metrics associated with progress on plans. A management system framework will also provide an approach for integrating business functions, in that functions across the organization are aligned in support of the selected goals and objectives.

4. CASE STATEMENT FOR THE INTEGRATION APPROACH

4.1 Drivers for Management Change

Utility managers participating on the Workgroup and in the research interviews identified a number of different drivers for considering utility management changes. These drivers included the following.

- Many utilities have an aging or aged infrastructure (e.g., many facilities are nearing the end of their design life). Thus utility managers are facing a need for increased investment in infrastructure maintenance and replacement. On top of the increased need, utilities are finding that there is a major decline in available grant money and other forms of financial support. This combination is forcing utility managers to think about how to do more with less, or how to better justify the need to find additional financial support.
- Utility managers are facing a variety of new or potential regulatory requirements to which they must respond (e.g., combined sewer overflows, sanitary sewer overflows, total maximum daily loads, Endangered Species Act, GASB-34, CMOM). Utility managers see these new or potential requirements as presenting more stringency, as well as an increase in the complexity and domain of requirements they must address.
- Utilities are encountering increasing public expectations for service, costs, environmental performance, and transparency. Utility managers also reported a greater public awareness and concern about environmental and public health concerns combined with increased expectations for public involvement and access to information.

- Public utilities in the U.S. and abroad are feeling competitiveness pressures from private entities that are driving needs to improve productivity and control costs. Due to competitiveness pressures, there is a greater need for clarity about the standards and performance measures for services provided.
- Changing demographics in the work force and the departure of a significant portion of the organization's intellectual capital has increased the need for well-documented and reproducible work policies and procedures.

These drivers, either individually or in combination, are leading utility managers to think about how to manage differently and to examine existing management tools and management system frameworks to support change.

4.2 Drivers for Continual Improvement Management System Adoption

Utility managers participating on the Workgroup and in the research interviews identified a number of different drivers for considering adoption of a continual improvement management system framework. These drivers included the following.

- The need for a clear and comprehensive basis for defining, achieving, communicating, and receiving recognition for a high performance management approach and associated performance outcomes.
- The need for more efficient and consistent means to improve productivity (optimize performance), improve service across the entire scope of operations, identify and implement best practices, and engender teamwork and staff development.
- The need to integrate and balance desired management outcomes on an enterprise-wide basis.
- Many of the management tools available to utility managers do not provide for or readily link to a management system framework that will support consistent, effective implementation in a sustainable fashion.
- A combination of peer encouragement and relationships, as well as the desire for excellence.

4.3 Potential Benefits of a Shift to a Continual Improvement Management System and Overall Management System Integration

Utility managers participating on the Workgroup and in the research interviews identified a number of different benefits of implementing a continual improvement management system. These benefits included:

- Continual improvement in desired management outcomes: financials; quality (process, product, and service); impacts/risks (environmental, health, and safety); and human resources;
- Operational consistency and reliability;
- Improved teamwork, interdepartmental coordination, and employee awareness; and
- Critical customer responsiveness and recognition.

Below are some specific examples in each of these benefit areas. These examples come from participants of the Workgroup or other utility managers interviewed in the research process.

4.3.1 Continual Improvement in Desired Management Outcomes

Because the majority of the managers interviewed were implementing a continual improvement management system with an environmental focus, many of the following examples relate to outcome improvements in terms of environmental impact or cost.

- The Port of Houston, Texas indicated that they had achieved better environmental performance through their EMS and its focus on impacts, and not just meeting regulatory requirements. Managers from the City of San Diego, California's Metropolitan Wastewater District expressed the same sentiment. They have implemented an ISO 14001 EMS and are incorporating the NBP EMS for Biosolids into it. The Port of Houston is also benefiting from lower waste disposal costs due to efficiencies gained through their EMS.
- Sydney Water Corporation (Sydney, Australia) expressed similar benefits from their Integrated Management System, which has integrated all four management outcomes - impacts/risk, quality, financials, and human resources – in the context of an ISO 14001 EMS. Sydney Water Corporation managers believe they have benefited from improved efficiencies, better plant performance, reduced costs, and better control resulting in more consistent outcomes. Some quantifiable achievements include: 70% reduction in total phosphorus load discharged; 80% reduction of ammonia-nitrogen load discharged; 30% reduction in total nitrogen load discharged; and 25% reduction in operating costs. This has all been achieved during a six-year period when total flow increased by 30%.
- The City of Eugene, Oregon's Wastewater Division, through implementation of an EMS, is expecting to see reductions in electrical power consumption, vehicle fuel use, and in non-recyclable garbage generated. This will result in both reduced costs and environmental impacts. So far, the EMS at Eugene's Wastewater Division has helped to save more than half a ton of paper (a 20% reduction) and reduced electrical energy use by 11% in the past year.
- The Charleston, South Carolina Commissioners of Public Works (CPW) have also experienced benefits from the implementation of their ISO 14001 EMS. The Wastewater Collection Department of CPW has seen a 29% reduction in vehicle fuel usage in a three-year period (surpassing its goal by 20%). CPW has met its goal of achieving 100% recycling of all waste materials (includes tires, batteries, waste oils, oil filters, and paper). As well, CPW has been able to extend the life of its equipment, resulting in cost reductions, by improving its ratio of preventive to corrective maintenance.

4.3.2 Operational Consistency and Reliability

Many of the benefits cited relating to operational consistency and reliability ultimately resulted in the quantifiable types of outcome improvements cited above. Below are some additional examples that are less quantifiable, but believed by utility managers to be important benefits nonetheless.

- At Sydney Water Corporation, managers expressed a sense of more control of plant operations for more consistent outcomes.

- At the Eugene Wastewater Division, managers have created a vastly improved system for handling documents and records through their EMS. Other utility managers have also created improved document and records handling systems and credit these systems for greater ease in employees knowing where to find needed information.
- The Charleston, SC Commissioners for Public Works (CPW) cited improved reliability, especially in the area of maintenance, as a result of their EMS. CPW managers also stated that they could better handle problems and issues as they arise, because everything is addressed through the EMS, meaning there is a documented resolution that solved the problem.
- For the City of San Diego Metropolitan Wastewater District, the implementation of the EMS has increased institutional knowledge and memory, creating more consistency and reliability in the long-term. Other utility managers also cited this benefit as being an important given the increased rates of staff turnover and retirements.

4.3.3 Improved Teamwork, Interdepartmental Coordination, and Employee Awareness

- The Louisville and Jefferson County, KY Metropolitan Sewerage District, a utility participating in EMS for Local Government Initiative, is finding broader staff buy-in and greater staff understanding of how the environment is “everybody’s job”. The utility has found that defining roles and responsibilities has increased employee understanding about roles and increased their sense of accountability. As well, the implementation of the management system has improved internal communications.
- At Sydney Water Corporation, managers attribute reduced duplication of efforts to the implementation of their Integrated Management System. As well, managers at the San Diego Metropolitan Wastewater District cited increased efficiency and increased internal communications as a result of their EMS. Similarly, at the Orange County Sanitation District in California, where the wastewater treatment plant is implementing the NBP’s EMS for Biosolids, managers are experiencing a reduced duplication of efforts and improvements in interdepartmental communications.
- At the Eugene Wastewater Division, managers find that employees are becoming more comfortable with idea of being audited (part of their EMS) and that this increases the employees’ sense of accountability.
- At CPW, benefits from implementing their EMS include more employee training, which in turn has increased competency and productivity. Training has also transferred accountability from management down to the employees.

4.3.4 Critical Customer Responsiveness and Recognition

- The Jefferson County General Services Department and Fleet Management has implemented an EMS. They are currently talking with bond rating agencies about potential benefits. Rating agencies have recognized that, in taking time to examine day-to-day business, Jefferson County has created a workplace that was less likely to generate injuries or serious environmental accidents. Less risk means greater opportunity for return on investment. The rating agencies have indicated that the potential impact of the EMS is a 1/16th to 1/8th of a point improvement, which could translate to millions of dollars of taxpayers’ money saved

each time money is borrowed for capital projects. The Port of Houston is also in discussions with bond rating agencies about potential for improved ratings based on their implementation of an EMS.

- At Louisville and Jefferson County Metropolitan Sewerage District, managers cited improved communications with outside parties and the public as a result of their management system.

5. USING THE INTEGRATION APPROACH TO LINK AND LEVERAGE MANAGEMENT INITIATIVES

Table 2 describes the key features of each of the management initiatives. As well, the table describes how each of the management initiatives supports the four components (plan, do, check, act) of the continual improvement management system framework. The table begins with the five examples of continual improvement management systems examined for this project: ISO 14001; ISO 9002; OSHA Voluntary Protection Program; EMS for Local Governments Initiative; and the National Biosolids Partnership EMS. As the table shows, each of these management system frameworks supports all four components of a continual improvement management system in a similar fashion, especially in the checking and acting components. The table describes the unique elements of the management system frameworks in how they address the planning and doing components. As well, the table shows how each of the management system frameworks support a different management outcome. The table then depicts the management tools examined for this project, showing how they uniquely support the management system framework components.

5.1 Utilizing the Integration Approach to Establish Continual Improvement Management In a Utility

The Workgroup observed that a natural affinity exists between environmental management system frameworks, such as ISO 14001, and the integration approach. This is because the fundamental purpose of a utility is to provide an environmental/public health service and manage for environmental/public health impacts. Therefore, starting with a management system focusing on environmental impacts is a good way to introduce the management system framework to a drinking water or wastewater utility. Since the basis for a continual improvement management system can be provided by several continual improvement management system frameworks, the Workgroup examined 5 such examples: ISO 14001; ISO 9002; National Biosolids Partnership EMS; EMS for Local Governments Initiative; and OSHA Voluntary Protection Program.

Although the Workgroup believes that an environmental management system presents a natural fit with water and wastewater treatment utilities, any one of the management system frameworks (ISO 14001, ISO 9002, NBP EMS for Biosolids, OSHA Voluntary Protection Program) will support introduction of the continual improvement approach in a highly similar manner, although they focus individually on different management outcomes. The management outcome(s) on which a utility manager wants to focus initially would determine which management system framework(s) to implement. As described above in section 3.3, once introduced, any one of the management system frameworks can be leveraged to address additional management outcomes through adjustments or additions to the support elements, while keeping the core elements fundamentally intact.

Table 2: Overall Characterization of Management System Initiatives

<p>E = Environmental Risks and Impacts O = Occupational Safety and Health Risks and Impacts Q = Quality (e.g., process, products, or service) H = Human Resources (e.g., employees, skill base, training) F = Financials (e.g., costs, capital assets, customer rates)</p>					
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Initiative	Management Outcome(s) Supported				Key Features	Continual Improvement Management System Framework Components			
	E	O	Q	H	F	Plan	Do	Check	Act
ISO 14001 ⁶	X					<ul style="list-style-type: none"> Supports establishment of continual improvement management system Not specifically-tailored to water / wastewater treatment utilities 	<ul style="list-style-type: none"> Approach for establishing operational practices, procedures, and policies (PPP) Approach for aligning PPP with organizational policy and goals 	Approach for monitoring and measuring performance, conducting internal audits, identifying system non-conformances, and developing corrective and preventive actions	Approach for conducting management reviews and making adjustments to system and operations on a regular, ongoing basis
ISO 9002			X			Approach for establishing quality policy and self-identification of quality goals and plans	Similar to above	Similar to above	Similar to above

⁶ While there is no explicit quality requirement in ISO 14001 as it relates to standard deviations, etc., it is strongly implied by virtue of commitment to meet all applicable regulations and monitoring and measuring requirements, as well as the continual improvement process. The standard also requires demonstrated competency in human resources, especially those jobs which could have an impact on the environment.

Initiative	E	O	Q	H	F	Key Features	Plan	Do	Check	Act
OSHA Voluntary Protection Program		X				<ul style="list-style-type: none"> Supports establishment of continual improvement management system Not specifically-tailored to water / wastewater treatment utilities 	Approach for self-identification of occupational safety and health impacts and performance goals	Similar to above	Similar to above	Similar to above
EPA EMS for Local Government Initiative	X					<ul style="list-style-type: none"> Supports establishment of continual improvement management system, based on ISO 14001 Directed at local government operations 	Approach for establishing environmental policy and self-identification of environmental impacts and performance goals	Similar to above	Similar to above	Similar to above
NBP EMS for Biosolids Program	X					<ul style="list-style-type: none"> Supports establishment of continual improvement management system, based on ISO 14001 Focused on biosolids value chain within wastewater treatment operations Has enhanced public participation & communications elements 	Approach for establishing biosolids policy, based on NBP Code of Good Practice, and self-identification of biosolids impacts and performance goals	Similar to above, plus provides Manual of Good Practice for Biosolids, identifying best PPP for biosolids	Similar to above, plus program requirements for mandatory third party verification	Similar to above

Initiative	E	O	Q	H	F	Key Features	Plan	Do	Check	Act
Balanced Scorecard			X	X	X	Provides a high-level planning tool for balancing across management outcomes	Approach for looking across management outcomes to create a single, organizational vision and strategy	Limited attention	Limited attention	Limited attention
CMOM	X					Proposed EPA rule, currently implemented only in Region 4, for improving management, operation, and maintenance programs for sewage collection systems and wastewater treatment plants	Approach for assessing capacity of collection systems and wastewater treatment plants for meeting peak flows and maintain compliance with NPDES permit requirements	Approach for optimizing collecting systems and treatment facility operations, enforcing sewer use ordinances, maintaining information systems on operation and maintenance, and providing employee training on the CMOM program	Approach for review of preventative and maintenance procedures and tracking performance indicators	NPDES permit audits as part of the permit application (Region 4 only)
Partnership for Safe Water	X					Supports benchmarking of drinking water turbidity and provides beyond-compliance turbidity goals	Approach for benchmarking turbidity and specific targets that exceed federal regulations for safe drinking water	Limited attention	Limited attention	Limited attention

Initiative	E	O	Q	H	F	Key Features	Plan	Do	Check	Act
QualServe	X	X	X	X	X	Supports a high-level evaluation of all aspects of utility operations	Provides an approach for establishing a baseline of utility operations and identifying areas for improvement, which can be utilized to set strategic direction, policy, and goals	Limited attention	Evaluative tools can be used as one way of assessing current practices	Limited attention
APWA Management Accreditation Program	X	X	X	X	X	Supports self and peer-based assessments of conformance with APWA recommended practices	Approach for assessing existing PPP, identifying areas for improvement, establishing goals for conforming with recommended best practices, and developing strategic plans for improvement	Guidance on recommended best management practices	Evaluative tools can be used for checking on current practices	Limited attention
Bid-to-Goal					X	Provides an approach to develop clarity on needed performance that would be competitive with private sector alternatives	Approach for establishing goals, reflective of the level of savings needed to be competitive with potential private sector proposals	Limited attention	Limited attention	Limited attention

Initiative	E	O	Q	H	F	Key Features	Plan	Do	Check	Act
Asset Management					X	<ul style="list-style-type: none"> Provides approach to develop an infrastructure investment strategy that supports capacity needs Provides guidance on linking asset management with strategy development, financial planning and reporting, business process design 	Approach for assessing asset conditions, integrating maintenance and replacement needs with capital requirements for growth / improvements, and communicating asset-related decisions	Approach for developing maintenance PPP for meeting long-term strategies for best mix of investments in repair, rehabilitation, and replacement of assets at lowest overall cost	Limited attention	Limited attention
GASB-34					X	Provides accounting standard for local and state governments, requiring full accrual accounting (reporting the value of infrastructure assets)	Similar to asset management	Similar to asset management	Similar to asset management	Similar to asset management
AWWA Proposed Accreditation Program ⁷	X	X	X	X	X	Proposed accreditation program based on conformance with standards for water and wastewater utility operations (standards not yet developed)	Unknown / not yet developed	Unknown / not yet developed	Unknown / not yet developed	Unknown / not yet developed

⁷ The AWWA Accreditation Program is currently under development and may or may not cover all management outcomes.

Malcolm Baldrige National Quality Program			X	X	X	Award program recognizing performance in leadership, strategic planning, customer & market focus, and information & analysis	Limited attention	Provides high- level good management practices	Limited attention	Limited attention
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5.1.1 Similarities of the Continual Improvement Management System Frameworks

This section describes how each of the continual improvement management system frameworks support the “plan, do, check, act” components in a similar fashion. As Table 2 indicates, there is substantial overlap in how the five management system frameworks support the do, check, and act components. With respect to the plan component, the key differences derive from their focus either on different management outcomes or their specific tailoring to a type of operation (e.g., biosolids management) or economic sector (e.g., local government). Details of the commonalities among the frameworks in each of the components are detailed below.

Planning

In the area of planning, each management system framework provides an approach and methods, with respect to the management outcome they focus on, for:

- Establishing utility policy;
- Establishing utility goals and objectives;
- Identifying legal and/or other voluntary requirements; and
- Developing plans for achieving objectives and targets, including metrics for measuring progress towards goals and objectives.

Doing

Each of the management system frameworks supports the implementation component in a similar manner although they focus individually on different management outcomes. Most importantly, each of the management system frameworks provides an approach and methods for:

- Establishing operational practices, procedures, and processes; and
- Aligning them with the organization’s policy, goals, and objectives.

In addition to providing an approach to establish operational procedures to support the policy and meet objectives and targets, each of the management system frameworks provides additional implementation elements that also align with and support the organization’s policy and goals, such as:

- Roles and responsibilities;
- Document control procedures;
- Communications; and
- Training.

Checking

Each of the management system frameworks supports the checking component by providing elements that establish an approach for:

- Monitoring and measuring performance;
- Conducting internal audits;
- Identifying management system nonconformances; and
- Developing corrective and preventive actions.

Acting

Each of the management system frameworks supports the acting component by providing an approach for

- Conducting management reviews; and
- Making adjustments to performance goals, management system elements, operations, and policies on a regular and ongoing basis.

5.1.2 Unique Elements of the Continual Improvement Management System Frameworks

This section describes the unique elements contributed by each management system framework that can be incorporated into a continual improvement management system.

ISO 14001

ISO 14001 is an internationally recognized EMS standard that can be utilized by any industrial sector or type of organization. ISO 14001 provides for the self-identification of environmental policy, impacts, performance goals, and objectives, with the expectation that the minimum performance target is environmental regulatory compliance.

In addition to establishing an organizational environmental policy, ISO 14001 provides the following unique planning elements:

- Identifying environmental aspects (activities, products, or services which can interact with the environment) by characterizing waste streams (air, effluent, solid / hazardous waste) and identifying environmental requirements (regulatory and other voluntary commitments);
- Identifying environmental impacts associated with environmental aspects;
- Identifying which functional units are associated with the impacts;
- Setting environmental objectives and targets (with associated metrics) for reducing impacts;
- Identifying business units or individuals responsible for achieving objectives and targets;
- Developing action plans and time lines for achieving objectives and targets; and
- Establishing emergency procedures.

Organizations that implement ISO 14001 determine how to establish operational policies, practices, and procedures that align with organizational objectives and targets for environmental performance improvement. Some industry sectors have developed industry-specific best policies, practices, and procedures to complement ISO 14001 implementation.

ISO 9002

ISO 9002 is an internationally recognized quality management system standard that can be utilized by any industrial sector or type of organization. ISO 9002 provides for the self-identification of Quality policy and objectives.

ISO 9002 provides an approach and methods for quality performance planning. ISO 9002 provides the following unique planning elements:

- Establishing quality policy and objectives;
- Identifying quality requirements (although not levels); and
- Defining and documenting how quality requirements should be met (e.g., establishment of quality plans).

As with ISO 14001, organizations that implement ISO 9002 determine how to establish operational policies, practices, and procedures that align with organizational objectives and targets for quality management. As well, some industry sectors have developed industry-specific best policies, practices, and procedures to complement ISO 9002 implementation.

OSHA Voluntary Protection Program (VPP)

This is a voluntary program of the Occupational Safety and Health Administration. OSHA VPP provides an approach and methods for occupational safety and health planning. Specifically, OSHA VPP supports:

- Developing occupational safety and health policy, goals, and objectives; and
- Conducting worksite safety analysis.

With respect to the implementation component, OSHA VPP establishes safety / hazard prevention and control procedures (includes substantial employee involvement requirements). OSHA VPP supports the checking component by providing an approach to establish procedures for reporting safety concerns. As well, OSHA VPP provides an approach for self-inspection and accident investigation, which are similar to measuring/monitoring and corrective action elements of the other management system frameworks.

NBP EMS for Biosolids

The NBP EMS for Biosolids also includes the planning elements provided by the other management system frameworks. However, rather than focus on environmental impacts broadly, as does ISO 14001, the NBP EMS for Biosolids is specifically focused on those impacts that relate to biosolids management, and is thus designed for use by wastewater treatment utilities that create and manage biosolids. Because of its specific focus, utility managers concerned with biosolids outcomes may utilize the NBP EMS for Biosolids in one of two ways. Utility managers could adopt the biosolids specific elements and pull them into another management system framework, such as ISO 14001. The Metropolitan Wastewater District in San Diego has adopted this approach. Or, a manager could implement the NBP EMS for Biosolids as the basis for establishing the continual improvement management system framework within the utility. Several dozen utilities across the country participating in the NBP EMS for Biosolids Program are taking this approach.

The NBP EMS for Biosolids provides implementation component elements similar to ISO 14001. However, since the NBP EMS for Biosolids is specifically focused on biosolids management, elements related to the establishment of operational procedures are limited to the specific business units associated with biosolids management. The NBP EMS for Biosolids also has additional requirements associated with public participation and communications. One of the most significant differences of the NBP EMS for Biosolids from ISO 14001 is that the NBP Program provides a National Manual of Good Practices. In this regard, the NBP EMS for Biosolids provides specific guidance and direction on the use of operational-level good practices related to biosolids production and management. ISO 14001, on the other hand, does not provide direction on best practices, as it is not industry-specific like the NBP EMS for Biosolids (specific to wastewater treatment utilities).

A unique aspect of the NBP EMS for Biosolids is that it supports the checking component by providing elements that establish specific reporting formats and procedures associated with performance and audit reports.

EPA EMS for Local Government Initiative

The EPA EMS for Local Government Initiative is based on the ISO 14001 environmental management system standard. As such, this initiative provides an approach for all of the management system components in the same manner as ISO 14001.

5.2 Utilizing the Management Tools in the Context of a Continual Improvement Management System Framework

In the context of a continual improvement management system framework, utility managers can draw on one or a combination of the management tools to support the planning and implementation processes, depending on the management outcomes of interest. The management tools typically provide concrete recommendations, direction, and methods for selecting performance goals and objectives (part of planning) or for evaluating or selecting best practices, policies, and/or procedures (part of implementation). A number of the tools examined originated in the private sector and have begun in the past five years to be effectively implemented in the public sector. Some of the tools are industry specific (tailored for water and/or wastewater utilities), and thus enable more effective tailoring of the more generic management system frameworks to specific utility circumstances.

As Table 2 indicates, the management tools, either individually or in combination, touch on the full range of management outcomes. Additionally, a number of the tools are specifically tailored for use by water and/or wastewater utilities. In general, the strength of these tools resides in their support to planning activities that identify performance objectives for the enterprise and their support to the identification of utility “best” practices, procedures, and performance levels. This is evidenced in the table by the consistent relationship shown to the planning and doing components. At the same time, the tools, in general, focus limited (and in some instances no) attention on the checking and acting components, with the table showing limited support from the tools in these areas. The table does highlight how a utility manager can, depending on the management outcome(s) of focus, combine tools with management system frameworks to produce an overall, more comprehensive and utility-specific management approach.

Balanced Scorecard

The Balanced Scorecard is a high-level planning tool. Organizations tend to juggle a number of improvement initiatives at the same time, ranging from process mapping to benchmarking to administering customer satisfaction surveys. But they often lack the alignment to cohesively structure these initiatives in a way that addresses an overall strategy. The Balanced Scorecard is designed as a framework that links business strategies with day-to-day activities and provides a means of focusing people's attention on desired behaviors and desired results. Balanced Scorecard seeks to align measures with strategies in order to track progress, reinforce accountability, and prioritize improvement opportunities. Unlike a bottom-line analysis, a Balanced Scorecard integrates four related perspectives: finance; customers; internal processes; and innovation and learning. Essentially, it is a means of understanding the overall performance of an organization.

The Balanced Scorecard approach is structured to provide measures that balance the need to: 1) anticipate and meet customer expectations; 2) provide training and career growth opportunities for employees; 3) improve business processes to meet demands of better-faster-cheaper than the competition; and 4) view past financial performance. Potential advantages of the Balanced Scorecard are that:

- It is a forward looking method as opposed to traditional financial history methods which can suffer significant lag time to address declining measures;
- It seeks to balance many of the conflicting priorities that serve as a basis for decisions; and
- It is designed to align departmental and personal goals with an organization's strategy.

The Balanced Scorecard can be implemented across an organization. It also can measure the performance of a small team or department, and can exist at multiple levels within an organization.

The Balanced Scorecard has been used at the federal, state, and local government level in order to adhere to legislative mandates such as welfare reform, health care, administration, and finance. A principle lesson learned is that the creation of a Balanced Scorecard can move the governmental entity to integrate their strategic planning and budgeting processes, which results in operational and financial efficiencies. When used in conjunction with other best business practices, the Balanced Scorecard is a tool with which to manage, monitor, and measure the organizations' actual performance and success. The Balanced Scorecard also can support an organization's communication plan and the ultimate implementation of strategic plans and the establishment of performance budgets throughout the organization in a cascading fashion.

The Balanced Scorecard can be used to support the planning component of a continual improvement management system framework by providing an approach for looking across all desired management outcomes simultaneously to create a single, all-encompassing vision and strategy. Utility managers who have implemented one of the management system frameworks could utilize Balanced Scorecard in developing the vision, goals, and objectives for expansion to include other management outcomes. This approach was used by the City of Eugene's Wastewater Division, which began by implementing ISO 14001 and is now utilizing the Balanced Scorecard to develop its vision, goals, and objectives for expanding its EMS to include other management outcomes. Alternatively, utility managers could utilize the Balanced Scorecard, before implementing a management system, to determine how a management system framework might best support the overall organization vision, goals, and objectives.

Although the Balanced Scorecard lacks explicit elements for checking and acting, connecting the Balanced Scorecard to a management system framework allows a utility to monitor/measure against performance targets, establish a regular review cycle for checking performance, and re-evaluate policy/strategy/vision. Balanced Scorecard performance measures and targets drive the need to connect to checking and acting processes. Without such connections, the effort to develop a Balanced Scorecard might not deliver tangible benefits.

Capacity, Management, Operation, and Maintenance (CMOM)

CMOM objectives are derived from a desire to improve sewer system operation and maintenance. When wastewater systems are not properly managed, operated, or maintained, the National Pollutant Discharge Elimination System (NPDES) permit limits can be exceeded at the associated treatment plants, and sanitary sewer overflows (SSOs) can occur from the collection/transmission systems. The infrastructure investments can deteriorate, with degraded water quality as a possible outcome. NPDES permittees are familiar with the permit regulations and requirements, but in many utilities the sewer system has been maintained by a different department than the wastewater treatment authority, and thus often had little knowledge of the permit conditions.

The proposed CMOM rule emphasizes that good operation and maintenance is a function of good management. The capacity aspect of the rule stresses: proper installation of new and rehabilitated

lines; inter-jurisdictional agreements for wastewater services; requirements for the implementation of an information management system; capacity assurance; development of overflow response and emergency operations plans; an assessment of the system's physical conditions; and a determination of which components need to be repaired. CMOM also requires training, a summary of the management program, and periodic audits to be done by municipalities to determine the effectiveness of the program.

Utility managers that want to focus on the capacity of collections systems and treatment facilities could use CMOM as a blueprint. CMOM can be linked with an existing management system framework, or used to develop a basic “plan, do, check, act” framework focused on managing the capacity of collections systems and treatment facilities. The Western Carolina Regional Sewer Authority used this latter approach in implementing its CMOM.

In either approach, CMOM can be used in the planning stage to conduct a self-evaluation assessing capacity of collections systems and treatment facilities to treat peak flows and maintain compliance with permit requirements.

CMOM can support implementation by providing an approach for:

- Optimizing collection systems and treatment facility operations;
- Implementing and enforcing sewer use ordinances or other legally binding documents;
- Maintaining information management systems that contain timely information for system operation and maintenance;
- Providing adequate preventative and routine maintenance, and continually review and update procedures;
- Ensuring all feasible steps are taken to stop and mitigate the impacts of SSOs and develop an overflow response plan; and
- Providing employee training on the CMOM program.

CMOM provides an approach for checking by establishing continual review of preventative and maintenance procedures, periodical review of CMOM program procedures, and tracking of performance indicators. CMOM supports the acting component by establishing regular updates to preventative and maintenance procedures and CMOM program procedures. As well, CMOM supports acting through audits as part of the NPDES permit application (currently required by EPA Region 4).

Partnership for Safe Water

The Partnership for Safe Water is a voluntary performance program that incorporates benchmarking through data collection. The Partnership for Safe Water provides specific targets for drinking water turbidity that exceed federal regulations for safe drinking water. Utility managers who want to focus on drinking water turbidity improvements can implement Partnership for Safe Water by: adopting turbidity performance targets; collecting turbidity data to provide a benchmark of utility performance; and continuing an annual cycle of making improvements and collecting turbidity data. How a utility increases turbidity performance through adjustment of policies and practices is up to the individual utility – Partnership for Safe Water does not provide best practices in this regard. In the context of a management system framework, the targets provided by the Partnership for Safe Water can be directly incorporated into the process of setting goals and objectives.

QualServe

QualServe provides an approach for utilities to perform a high-level evaluation of all aspects of utility operations. QualServe covers all utility management outcomes including financials, quality, impacts/risk (environment, health and safety management), and human resources. Utility managers can implement QualServe to prepare a baseline or benchmark of where it is starting from, which can be utilized in the process of setting strategic direction and policy, as well as in setting organizational goals and objectives. In this fashion, QualServe can support the planning phase of developing a management system framework. However, while QualServe provides insights to an organization on where opportunities for improvement exist, it does not provide specific guidance or direction on how to implement those improvements. As such, a utility could take advantage of the lessons learned from QualServe by linking them with a management system framework that includes systemic implementation of improvement plans.

Although not specifically designed to support monitoring/measuring, auditing, or corrective/preventive actions, QualServe can support the checking component of a management system framework by using the evaluative tools provided by the program as one way of assessing current practices.

APWA Management Accreditation Program

APWA Management Accreditation Program is a planning tool that can be used in the context of a management system framework to provide an approach for: assessing existing policies, practices, and procedures; identifying deficiencies that need correction; establishing goals for complying with recommended practices (recommended by APWA); and developing strategic plans to meet goals and correct deficiencies. The program provides a “Works Management Practices Manual” that is used as the basis for self-assessing policies, practices, and procedures, and developing plans for improvement. Like QualServe, the APWA Program covers all utility management outcomes including financials, quality, impacts/risk (environment and health and safety management), and human resources.

As a requirement of receiving program accreditation, organizations must develop plans for how to improve policies, practices, and procedures to meet goals and implement recommended best practices. The implementation of a management system framework can be a way to implement systemically the plans for improving policies, practices, and procedures and align best practices with policies, goals, and targets.

The APWA Program can support the checking component of a management system framework by using the evaluative tools provided as one way of checking on or evaluating current practices. As well, the cycle of accreditation (every 3 years) of the APWA Program is built on the concept of continual improvement in that organizations are required to submit annual reports indicating changes that have been made to improve policies, practices, and procedures. As such, utility managers could link these requirements of the APWA Program with the reporting and management review elements of a continual improvement management system framework.

Bid-to-Goal

Bid-to-Goal is a service improvement and cost saving planning tool. Utility managers wanting to focus on the bid process and confronting privatization pressures might utilize Bid-to-Goal. Bid-to-Goal provides an approach for establishing goals that are reflective of the level of savings

needed to be competitive with potential private proposals. As such, Bid-to-Goal could be used in the planning phase of developing a management system framework.

Bid-to-Goal provides an approach for developing a strategy that focuses on the hitting of a savings goal rather than using managed competition. Public employees meet that savings goal via a detailed offering, or a memorandum of understanding (MOU), much like that of the private sector service agreement. During the term of the agreement, which could run five to six years (with options to extend), performance discrepancies could trigger an automatic bidding process.

Three factors lead to the development of Bid-to-Goal.

- First, it can take time to implement the changes needed to become competitive. Bid-to-Goal has the potential to link firm performance criteria with phased progress.
- Second, many communities have launched business planning and competitiveness programs that feature open-ended processes. They are open-ended in that they provide no clear direction as to the results that are expected once the plans are submitted. The detailed self-analyses by public agencies are compiled in public documents that could seriously undermine the ability to bid successfully in managed competition. Bid-to-Goal requires detailed self-examination and the production of a business plan after the community has committed to firm requisites for acceptance.
- Third, there is growing reluctance among the major contract operations companies to participate in managed competition. They are not likely to bid if they do not believe they can provide the service for less than the municipal entity. For communities focused on the goal of achieving significant savings without impacting the quality of service, Bid-to-Goal provides an opportunity for public employees to demonstrate, over a reasonable period of time, that they can reach optimum levels. If the public employees fail to reach their goals, they can be precluded from participation, thus attracting private companies into a bidding pool.

There are specific criteria that must be developed as the basis for awarding the MOU including:

- A *goal* reflecting the level of savings needed to be competitive with potential private proposals (assuming that private companies charge for profit and other private sector costs);
- A *scope* of work describing the level of service, including safety margins desired by the community, in exchange for a service fee; and
- A firm *schedule* for submitting a jointly signed offering (management and labor) and for accomplishing the savings and performance promised under the MOU.

The goal must be matched to a specific scope of services with performance parameters detailed in the MOU. The goal represents the minimum savings required to comply with the process; however, incentives can be built into the service agreement to encourage additional savings to the community. Gain sharing programs can be used to provide incentives as well as to establish the basis for the accumulation of reserve funds and money that could play a similar role as a performance bond.

The time allowed for the development of a public offering is typically limited to less than one year (from the beginning of the Bid-to-Goal process) in order to provide a strong incentive for action. If the offering is not submitted within the time allotted, the community can solicit bids from the private sector.

Asset Management

Asset Management provides an approach for utilities to develop an infrastructure investment strategy that will support capacity needs. The planning component of a continual improvement management system, augmented by the management tools that provide guidance on recommended best practices, policies, and procedures, will generate a concrete sense of direction and drive operational and infrastructure needs for a utility. Asset Management methods can then be applied to evaluate these capacity needs in light of current infrastructure and support a utility's development of an infrastructure investment strategy that is fully integrated with and supportive of overall utility performance objectives. Asset Management will also make transparent the mid- and long-term financial requirements for achieving performance objectives.

In this regard, Asset Management provides a supplement to any of the continual improvement management systems by driving a specific focus on and providing methods for evaluating needs with respect to the financial requirements of maintaining the reliability of costs and delivering the capacity needed to support utility performance objectives. Specifically, Asset Management can support planning by providing an approach for:

- Articulating a strategic foundation related to the utility's mission and goals;
- Developing, monitoring, and reviewing asset conditions, as well as performance and risk measurements and targets;
- Integrating maintenance and replacement with capital requirements for growth, service improvements, and compliance; and
- Assessing and communicating the service, financial, and risk implications of alternative asset-related decisions.

Asset Management can support the implementation component of a continual improvement management system by providing an approach to align maintenance elements with goals and objectives and linking the Asset Management program with strategy development, financial planning, business process design, and internal and external communication programs. Asset Management also provides an approach for developing a maintenance management system (maintenance policies, practices, and procedures) for meeting long-term strategies for the best mix of investments in repair, rehabilitation, and replacement to get the most useful life out of assets at lowest overall cost.

To successfully achieve the Asset Management objectives of providing high quality service at a minimum cost and risk, an Asset Management program must include substantial checking (e.g., performance measurement and evaluation) and acting (e.g., review and improvement). Linking the planning and implementing components of Asset Management with a continual improvement management system framework can provide an approach to the necessary checking and acting components. This approach has been utilized by Sydney Water Corporation in Australia, as they have incorporated Asset Management into their ISO 14001 certified Integrated Management System. Other utilities have implemented advanced Asset Management programs to support continual improvement by developing their own measurements, auditing procedures, reporting procedures, management reviews, and improvement plans.

The Governmental Accounting Standards Board Statement 34 (GASB-34)

The Governmental Accounting Standards Board (GASB) adopted in June 1999 a new accounting standard that affects the way local and state governments report their finances. Statement 34 (GASB-34) mandates that governments change to a system of full accrual accounting, or

accounting that focuses on the flow of economic assets and recognizes costs as committed resources, regardless of when the expenditures are made. The new standards provide significant changes in the information provided in the organization's annual financial report, including the first ever requirement to report the value of the organization's infrastructure assets. GASB-34 affects all state and local governments that issue financial reports in conformity with generally accepted accounting principles.

GASB-34 has provided an alternative to the historic cost, less depreciation reporting method for infrastructure assets, called the modified approach. Agencies that have a comprehensive asset management system that includes an inventory, condition assessment, and a predictive maintenance/repair/restoration/replacement component will be allowed to forgo the required financial accounting for infrastructure assets. As such, the relationship of GASB-34 to the components of a management system may be described similarly to Asset Management.

The new requirements become effective based on the size of the reporting agency (city, county, township, not just the public works or infrastructure agency). Agencies with annual revenues exceeding \$100 million will start using the new standard beginning June 15, 2001; between \$10 million and \$100 million, the new rules will take effect June 15, 2002; and for those under \$10 million, the law will take effect in June, 2003.

AWWA Proposed Accreditation Program

The AWWA Proposed Accreditation Program, as currently envisioned, would support the implementation component of a management system by providing a series of standards for water and wastewater utility operations. These standards would provide guidance on operational-level utility best practices that could be incorporated into the operational procedures, practices, and processes of a management system framework. A utility manager could adopt and implement any or all of the utility operations standards, depending on their utility's scope of operations (e.g., a wastewater treatment utility would only be interested in operational best practices that apply to wastewater treatment and not those that apply to drinking water) and management outcomes on which their management system is focused.

Malcolm Baldrige National Quality Program

The Malcolm Baldrige National Quality Award has been the centerpiece of the Baldrige National Quality Program since 1988. It is an award presented annually in recognition of performance excellence of US-based or headquartered companies and organizations. The focus of the Baldrige Program is an organization's overall performance management system. Award-winners have become recognized role models and have shared their strategies with other organizations.

The Baldrige criteria for performance excellence consist of financial and non-financial perspectives. The criteria form a framework, which is adaptable to any organization, for improving overall performance. The following categories make up the criteria for the Baldrige system.

- *Leadership* - How the organization is guided, how its responsibilities are addressed to the public, and how good citizenship is practiced by the senior executives.
- *Strategic Planning* - How the strategic directions of the organization are set, and how the key action plans are determined.

- *Customer and Market Focus* - How the organization's requirements and expectations of customers and markets are determined.
- *Information and Analysis* - How the management, effective use, and analysis of data and information are carried out in order to support the organization's key processes and performance management system.

The Malcolm Baldrige National Quality Program criteria can support the implementation component of a continual improvement management system by defining, at a high-level, good management practices.

5.3 Examples of Different Approaches for Integrating Management Initiatives

The following are examples of how various management initiatives could be integrated, leading to the implementation of a continual improvement management system. There are many different approaches that a utility could use to integrate the management initiatives in the context of a continual improvement management system. These examples explore just a few options.

5.3.1 Start by Planning and Self-Assessing

One approach to integrating initiatives in the context of developing a continual improvement management system is to start with one of the tools that support utility planning, and then add in elements of doing, checking, and acting. Organization's that may not yet have management commitment, resources, or other critical success factors in place to develop and implement a continual improvement management system may want to start this way to build a better understanding of where improvement may be needed and build a case for eventually implementing a continual improvement management system.

For example, an organization could start with a tool that supports *planning* and self-assessing, such as QualServe or the APWA Management Accreditation Program, to identify areas for improvement. A utility could also use CMOM to conduct an evaluation of collection system and treatment capacity needs to prevent sanitary sewer / combined sewer overflows. Once an organization has identified improvement goals and targets, it could use these as the basis for developing plans for *implementing* change and driving the need for *checking* on performance goals and *acting* to make adjustments to meet those goals. Organizations can then use one of the continual improvement management system frameworks to support systematic, consistent implementation. Organizations that have gone through a self-assessment and peer review process, such as those provided by QualServe, the APWA Program, or the Malcolm Baldrige Award Program, have already taken a substantial step in identifying the areas for desired improvement around which a continual improvement system could be built.

Organizations can also draw on various tools that support planning while it is developing an EMS (rather than as a separate step from developing an EMS). For example, a utility could incorporate the turbidity performance targets of the Partnership for Safe Water into its performance goals and targets. As well, a utility could utilize Asset Management to determine its financial strategy for meeting asset requirements that will support the capacity needs, goals, and targets as determined during the planning phase.

5.3.2 Expanding Along the Value Chain

Another approach to integrating initiatives in the context of developing a continual improvement management system is to start with one business unit or part of the value chain and then expand incrementally to include the entire organization. This approach allows for starting small, learning lessons, and building upon success. There are a number of ways an organization could expand along the value chain, limited only by the total scope of the organization's operations.

One way an organization could expand this way would be to implement the NBP EMS for Biosolids, which focuses on the biosolids value chain, and then expand the elements of the EMS to cover other parts of the organization's wastewater treatment value chain, such as effluent discharge. Organization's currently participating in the NBP EMS for Biosolids Program could take this approach.

An organization could also implement an ISO 14001 EMS with just one business unit or department, and then replicate the EMS in other business units until the entire organization (and value chain) is covered. San Diego Metropolitan Wastewater District used this approach for implementing and expanding its ISO 14001 EMS.

The NBP Program's National Manual of Good Practice, the best practice standards envisioned under the proposed AWWA Accreditation Program, and any other industry best practice documents could be used to help an organization in tailoring the implementation components of its EMS as it expands along the value chain.

5.3.3 Increasing Management Outcomes

Some utilities have used the approach of beginning with a continual improvement management system that has a single management outcome focus, and then expanded it to include other management outcomes. Organizations have typically taken this approach because, while they have found that they experience benefits from their continual improvement management system, their system has not covered all of the important outcomes for which they manage. An advantage of this approach is that it allows an organization to establish some degree of comfort and experience with the operation of a continual improvement management system, based on one of the existing frameworks (e.g., ISO 14001) before incorporating other management outcomes.

One way to expand an already established continual improvement management system would be to use Balanced Scorecard to create a broader management vision and policy that consider additional management outcomes. For example, The City of Eugene's Wastewater Division began by implementing ISO 14001 and is now utilizing the Balanced Scorecard to develop its vision, goals, and objectives for expanding its EMS to include other management outcomes. Other management tools, such as QualServe and Asset Management, could also be used during the planning stage to set objectives that focus on additional management outcomes.

An organization that started with an EMS and decided to expand its focus to quality outcomes, could draw on ISO 9002 for quality management components. As well, if a utility decided to expand the continual improvement management system's focus to occupational safety and health outcomes, it could draw on the OSHA Voluntary Improvement Program for occupational safety and health oriented elements. In this manner, the utility could expand its EMS gradually to include other management outcomes. For example, Sydney Water Corporation in Australia began by implementing an ISO 14001 EMS. The organization then added quality elements by drawing

on ISO 9002, human resources elements by drawing on an Australian occupational health and safety standard, and asset management outcomes to their management system framework.

6. CRITICAL SUCCESS FACTORS FOR AND BARRIERS TO ADOPTING MANAGEMENT INITIATIVES AND POSSIBLE INCENTIVES FOR OVERCOMING BARRIERS

6.1 Critical Success Factors

Utility managers participating on the Workgroup and in the research interviews identified a number of factors they believed were critical to the successful implementation and maintenance of a continual improvement utility management system. These critical success factors included:

- Commitment from senior management (and/or endorsement of the governing body);
- Designated staff for the development effort;
- Entire plant involvement (for employee buy-in);
- Dedicated resources;
- Link to overall strategic planning;
- Sufficient time to implement;
- Follow through on the checking and acting processes; and
- Willingness and ability to make cultural shift to continual improvement.

An absence any of these critical factors may prevent the management system from being successfully implemented and maintained. For example, the management system might not be effectively implemented if there is a lack of employee buy-in, or it might disintegrate from lack of commitment or resources.

6.2 Barriers to Continual Improvement Management System Adoption

Utility managers participating on the Workgroup and in the research interviews identified a number of barriers they believed had the potential to impede the adoption and maintenance of a continual improvement management system. Utility managers participating on the Workgroup and in the research interviews also identified a variety of potential methods and/or incentives for overcoming those barriers. They also noted that some of the barriers might actually be perceived rather than real.

Barrier: Implementing a management system framework requires substantial, upfront resources and time.

Responses:

- A number of leveraging opportunities now exist. Because implementation of a management system framework is no longer “bleeding edge”, utilities can draw on the work of those who have “paved the way”. This has allowed for the cost and complexity of management system implementation to come down. As well, a number of handbooks, guidance documents, and presentations have been prepared and these also help prevent utilities from having to “reinvent the wheel”.
- As well, the existence of a number of utility management tools can play a critical role to help a utility manager specifically tailor the continual improvement management system to the

utility. The tools can substantially lower the burden of introducing a continual improvement management system into a utility by providing concrete planning methods and concrete guidance on best practices, procedures, and performance levels.

- Utilities can phase in a management system framework, starting with one plant or with one department and expanding, as they are able. Workgroup members recommended starting where the utility might encounter early successes.

Barrier: Need to provide justification for resources, however:

- It is difficult to quantify benefits;
- Benefits often are not seen until long after development and implementation costs are incurred;
- There are no clear requirements (e.g., adopting a management system is voluntary); and
- Conventional “plan and do” management is producing “satisfactory” results.

Responses:

- A number of clear benefits do exist and are being articulated by the early adopters of management systems (see benefits discussion above). Making information on these benefits readily available and more widely known would help utility managers make resource justifications.
- Regulatory responsiveness incentives, which do not yet exist, could make the resource requirements easier to justify and implementation of a management system framework more attractive.

Barrier: Implementing a management system framework requires a substantial cultural shift for managers, staff, and oversight board members, and there exists a general reluctance to change.

Responses:

- Promoting “best in class” status and best management practices will encourage peers who are less likely to change.
- Create operator training courses and incorporate management system concepts into trainings.
- Clearly present benefits to decision makers.
- Instituting ideas of continual improvement may require a long-term shift in thinking (not a “revolutionary change”).

Barrier: A management system framework generates increased paperwork associated with documenting the program.

Response:

- Documentation provides reproducible policies and procedures that are useful when utilities face changing workforce demographics and turnover of intellectual capital.

Barrier: A management system framework generates closer scrutiny (increased liability), creates more transparent performance goals, and results in more explicit operational evaluations.

Responses:

- Increased transparency can build confidence with outside audiences.
- Increased transparency can provide an opportunity to demonstrate “a job well done”.

7. CONCLUDING RECOMMENDATIONS

The Workgroup has concluded that it is both feasible and desirable to view and integrate the performance improvement initiatives in the context of a continual improvement management system framework, such as that provided by the ISO 14001 voluntary environmental management system, the NBP voluntary EMS Program, and the ISO 9002 voluntary quality assurance system. The Workgroup believes that the management system frameworks provide a well established and proven continual improvement management approach, while the tools offer specifically tailored methods and guidance to determine best practices and performance levels. Moreover, utilities' experience with the management system frameworks indicates they can offer distinct advantages over conventional utility management efforts, and they represent an opportunity and an effective means to integrate the various tools to support more effective utility management. Furthermore, the Workgroup believes that, because drinking water and wastewater utility operations are primarily focused on environmental and public health impacts, environmental management systems are a natural starting point for introducing a continual improvement management system into a utility.

The interviews conducted for this project indicated that the initiatives have provided utility managers with substantial benefits including: continual improvement in environmental, financial, and other management outcomes; operational consistency and reliability; improved teamwork, interdepartmental coordination, and employee awareness; and critical customer responsiveness and recognition. At the same time, utility managers are left with a sense of "initiative overload" and have found it difficult to discern how the initiatives interrelate and to identify opportunities to use them in concert to improve utility performance. This appears to inhibit adoption and/or limit value when utility managers view or implement the initiatives in a piecemeal fashion. In this context, the Workgroup believes it is highly desirable to provide utility managers with a clearer sense, such as that contained in this report, as to how these many initiatives interrelate and to identify appropriate strategies and approaches for best combining these offerings to meet utility objectives.

The Workgroup found that the management tools and system frameworks examined overlap quite substantially, covering individually or in combination the entire drinking water, wastewater treatment, and stormwater value chains. They further combine to address all major management outcomes (those high-level performance areas which utility managers must balance and manage), to which utilities direct attention and resources: financial health; product, process, and service quality; environmental, health, and safety impacts; and human resources.

The Workgroup found that the tools and management system frameworks reviewed during this project are naturally and highly complementary. Effectively and selectively combined, the initiatives can provide utility managers with a complete management package geared to improving performance. The Workgroup believes that the management system frameworks represent an opportunity and an effective means to integrate the various tools to support more effective utility management. Although the Workgroup believes that an EMS is a natural fit for water and wastewater utilities, any one of the management system frameworks examined can be utilized to put in place the core of a "plan, do, check, act" based continual improvement management system.

The management tools can enhance the management system frameworks by providing concrete planning methods and guidance on best practices, procedures, and performance levels. The tools

examined can help a utility manager specifically tailor the more general management system frameworks. As well, the tools play an important role by helping the utility determine where the need for improvement exists and how it improvement can be made by providing concrete planning methods and concrete guidance on best practices, procedures, and performance levels, all of which a utility must establish to ensure the continual improvement management system is firmly grounded in better performance. Moreover, the use of the tools can substantially lower the burden of introducing a continual improvement management system into a utility, as best practices, procedures, and performance levels can be drawn from the tools, rather than invented by each utility from scratch. Furthermore, linking the utilization of any one of the tools to a continual improvement management system imbeds the best practices and performance objectives in a proven approach that can aid consistency and effectiveness of implementation.

During the interviews, the Workgroup heard from utility managers about a number of barriers to the implementation of individual management initiatives. These barriers could potentially inhibit adoption of the integration approach. However, the Workgroup believes that these barriers are surmountable because the effective implementation of continual improvement management systems and the integration of multiple management initiatives have already been done successfully by some utilities. As well, because of these earlier successes, a number of the benefits to implementing a continual improvement management system and combining it with other management initiatives have been realized.

8. RECOMMENDED NEXT STEPS

The Workgroup's review and discussion of utility management initiatives, as captured in this report, have resulted in the articulation of a conceptual approach for integrating the initiatives. The Workgroup believes that further work in several areas is justified in light of the challenges facing utility managers, the benefits some utilities have realized from adopting versions of this concept, and the opportunity presented to better and more fully leverage the management initiatives. Suggested next steps include:

- Specific "proof of concept" efforts that can take a variety of forms including utility-based demonstration efforts, development of 2-3 case histories that map the effective use and relationships between the management initiatives, and more detailed "blueprinting" of current integration efforts;
- Further exploration of potential regulatory and financial incentives that might be provided to utilities adopting an integrated approach; and/or
- Further work dispelling concerns regarding implementation barriers through clear articulation of the benefits.

Recognizing the limitations of financial resources and the value of engaging the interest of utility managers in the potential benefits of an integrated EMS approach, the Workgroup suggested that immediate next steps focus on making the integration concept real and implementable for utility managers. Some suggested steps that the project sponsors could consider in the short term include:

- Showing the benefits of the EMS integration approach, possibly through pilot projects demonstrating implementation of EMS and integration with other management initiatives and showcasing a variety of ways to do this (success stories);
- Ongoing communications with and education of utility managers about EMS and their long-term benefits;

- Creating materials that could help utility managers quickly assess whether their organizations need to change, could benefit from an integrated approach, and how they are positioned (e.g., do they already have many elements of an EMS in place);
- Promoting networking and mentoring of agencies interested in EMS, potentially including public/private partnerships;
- Providing financial subsidies or technical assistance, such as that provided by NBP, to assist agencies who want to participate in pilot projects; and
- Working towards the development of award and recognition programs.

APPENDIX A – KEY TERMS AND DEFINITIONS

Management Initiatives (or Performance Improvement Initiatives) – A variety of utility management tools and management system frameworks available to and promoted for adoption by drinking water and wastewater utilities. These management initiatives are designed to improve organizational performance. Some initiatives are associated with formal programs while others take the form of guidance documents, voluntary standards, management methods, or regulatory requirements.

Utility Management Tools – A variety of tools designed to provide specific and concrete direction on and methods for selecting performance levels, best practices, and/or appropriate policies and procedures.

Management System Frameworks – Organizational approaches to managing outcomes based on a set of standard procedures and steps – a structured framework - designed to support continual improvement. Based on a “plan, do, check, act” continual improvement cycle.

Management Outcomes - Those areas for which a utility must typically balance and manage. The Workgroup identified the following management outcomes for water and wastewater utilities.

- Impacts/Risks – e.g., environmental impacts, occupational health & safety, public health & safety
- Quality – e.g., process, products, or service
- Financials – e.g., costs, capital assets, customer rates
- Human Resources – e.g., employees, skill base, training

Water, Wastewater Treatment, and Stormwater Value Chains - All water and wastewater utility business processes from collection/intake to distribution/output. The drinking water value chain includes: water source protection and intake; water treatment; solids handling and management; and water distribution and reservoir storage. The wastewater treatment value chain includes: wastewater collection and pretreatment; wastewater treatment and solids generation; polishing and effluent discharge; solids stabilization, conditioning, and handling; and biosolids transportation and disposition. The stormwater value chain includes: stormwater run-off detention and collection; water quality monitoring and treatment; and discharge.

APPENDIX B – LIST OF FREQUENTLY USED ACRONYMS

AMSA – Association of Metropolitan Sewerage Agencies (<http://www.amsa-cleanwater.org>)

AMWA – Association of Metropolitan Water Agencies (<http://www.amwa.net>)

ASDWA – Association of State Drinking Water Administrators (<http://www.asdwa.org>)

APWA – American Public Works Association (<http://www.apwa.net>)

AWWA – American Water Works Association (<http://www.awwa.org>)

AWWARF - American Water Works Association Research Foundation
(<http://www.awwarf.com>)

CMOM - Capacity, Management, Operations, and Maintenance

GASB – Governmental Accounting Standards Board (<http://www.gasb.org>)

EMS – Environmental Management System

ISO – International Standards Organization (<http://www.iso.org>)

NBP – National Biosolids Partnership (<http://www.biosolids.org>)

NAWC – National Association of Water Companies (<http://www.nawc.org>)

EPA – United States Environmental Protection Agency (<http://epa.gov>)

WEF – Water Environment Federation (<http://www.wef.org>)

WERF – Water Environment Research Foundation (<http://www.werf.org>)

APPENDIX C – CONTINUAL IMPROVEMENT MANAGEMENT SYSTEM FRAMEWORK ELEMENTS

I. **Commit:** Policy and Leadership

- A. Policy Statement: Establishment of a policy statement that sets direction and vision and is appropriate to the determined system scope (scope defined by management outcomes selected)
- B. Management Commitment
 - 1. An explicit statement of commitment (could be in form of signed letter)
 - 2. Provision of leadership and support (e.g., appointing a dedicated staff person and “rallying the troops”)

II. **Plan:** The planning components of the management system (A-D) must be consistent with the policy / vision and will be different, based on the management outcomes selected. To take the comprehensive EMS to its fullest form, a utility would cover all four management outcomes. However, if a utility follows a phased implementation approach, selecting one outcome at a time, then the management system planning components will look different.

- A. Management Outcomes (for product, process, and/or service): Selection of outcomes consistent with policy statement
 - 1. Impacts / Risks
 - a. Environmental
 - b. Health and safety
 - c. Quality
 - i. Process
 - ii. Product
 - iii. Service
 - 3. Financials
 - a. Operations / maintenance costs
 - b. Revenue management
 - c. Capital asset management
 - i. Asset investment
 - ii. Infrastructure requirements
 - iii. Facilities design and construction
 - 4. Human resources
- B. Identification of Requirements (across selected outcome areas)
 - 1. Legal (e.g., permit and compliance requirements)
 - 2. Voluntary Commitments
- C. Establishment of Goals and Targets (in selected outcome areas)
- D. Establishment of Metrics (for measuring program goals and targets)

III. **Do / Implementation:** The implementation components included will vary significantly by management outcome identified. (See note above about phased implementation)

- A. Operational Practices, Procedures, and Processes
 - 1. Standard operating procedures
 - 2. Standard maintenance procedures
- B. Structure, Roles and Responsibilities
 - 1. Management system accountability
 - 2. Organizational structure
 - 3. Staff roles and responsibilities
 - 4. Contractor roles and responsibilities
- C. Administrative Practices, Procedures, and Processes

1. Standard administrative procedures
2. Document control
 - a. Documentation of management system procedures
 - b. Recordkeeping
3. Data control and collection
4. Accounting procedures
5. Revenue management
- B. Communications
 1. Internal communications
 2. External communications (public involvement / information / education)
- C. Training
 1. Operations and maintenance
 2. Management system
 3. Safety
 4. Compliance
- D. Emergency Procedures
 1. Emergency preparedness and response
 2. Emergency risk management
 3. Safety procedures
 4. Employee involvement

IV. Check: Performance Measurement and Evaluation - These elements will be implemented in a management system, regardless of which management outcomes have been selected. However, their reach will increase, as more outcomes are included in the management system.

- A. Measurement: Establishment of techniques for measuring against goals/targets
 1. Monitoring and measuring
 2. Inspection and testing
 3. Statistical techniques
- B. Audits: Establishment of audit processes
 1. Internal
 2. External
- C. Reporting: Establishment of reporting formats and procedures
 1. Performance reports
 2. Audit reports
- D. Nonconformance and corrective / preventive action: Identification of management system nonconformances and corrective / preventive actions for addressing nonconformances

V. Act: Review and Improvement - These elements will be implemented in a management system regardless of which outcomes have been selected. Their reach will increase, as more outcomes are included in the management system.

- A. Management Review
- B. Improvement Plans
- C. Adjustments (to goals, to procedures, to metrics, etc.)

APPENDIX D - CHARACTERIZATION OF MANAGEMENT INITIATIVES RESEARCHED

(Presented in alphabetical order.)

Asset Management (AMSA Asset Management Handbook – “Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance”) - <http://www.amsa-cleanwater.org>

Participants – Wastewater utilities

Sponsors – AMSA in partnership with WEF, AWWA, AMWA

Overarching Program Type – Continual improvement approach for managing infrastructure capital assets based on self-defined performance goals, asset identification and evaluation, risk management and capital planning

Drivers – (For water and wastewater utilities) Aging infrastructure of water and wastewater systems and need to plan for infrastructure maintenance and replacement

Goals and Desired Outcomes – Provision of desired service levels while minimizing the costs of operation (e.g., high quality customer service provision at minimum cost and risk)

Benefits – Optimized performance, reduced risk, minimized costs

Steps and Requirements

- Articulate a strategic foundation related to the utility’s mission and goals
- Develop, monitor, and review asset condition, performance and risk measurements and targets
- Integrate maintenance and replacement with capital requirements for growth, service improvements, and compliance
- Assess and communicate the service, financial, and risk implications of alternative asset related decisions
- Link the asset management program with strategy development, financial planning and reporting, business process design, and internal and external communications programs

American Public Works Association (APWA) Management Accreditation Program - <http://www.apwa.net/>

Participants – Public works agencies

Sponsors – American Public Works Association (APWA)

Overarching Program Type – Voluntary, peer-based certification program, practice-based, continual improvement system

Drivers – Provide a means of formally verifying and recognizing public works agencies for compliance with recommended management practices

Goals and Desired Outcomes – Improved public works performance and provision of services, increased professionalism, impetus for self-improvement

Benefits – APWA recognition, improved effectiveness, clarified budget needs, identification of operation and management needs, team work and staff development, interdepartmental coordination, improved communications

Steps and Requirements

- Document practices and use recommended practices manual to assess existing policies, practices, and procedures and to identify deficiencies that need correction
- Establish goals for complying with recommended practices
- Develop a strategic plan to meet those goals and correct deficiencies and present the plan at a public meeting
- Once improvements are implemented, submit documentation demonstrating agency compliance with all applicable practices to the Accreditation Council who will determine if the agency is ready for an on-site assessment

- Receive on-site assessment performed by public works practitioners
- Receive accreditation form the Accreditation Council (three year re-accreditation cycle)
- Submit annual reports to retain accreditation

American Water Works Association (AWWA) Proposed Accreditation Program -

<http://www.awwa.org>

Participants – Water treatment, wastewater treatment, and combined utilities

Sponsors – AWWA

Overarching Program Type – Voluntary certification (independent third party), based on standards for water and wastewater utility operation and management (standards under development)

Drivers – Increased expectations about service from customers, stakeholder interest in proven utility efficiency and efficacy, heightened regulatory requirements, closer public scrutiny of tap water quality issues, tightening budgets and increasing pressure to reduce costs, greater concern about environmental issues among consumers

Goals and Desired Outcomes – Provide recognition for quality management practices

Benefits – AWWA recognition and certification, improvement of operations effectiveness and management efficiency, financial benefits as utilities become better investment risks, increased customer satisfaction

Steps and Requirements – Under development

Balanced Scorecard

Participants – Any organization

Sponsors – N.A.

Overarching Program Type - Voluntary, performance measurement planning tool.

Drivers – Provide a new way to measure performance (rather than external accounting data), based on a balance of perspectives.

Goals and Desired Outcomes - Align key performance measures with strategy at all levels of an organization, facilitate communications and understanding of business goals at strategies at all levels of an organization, and provide feedback and learning.

Benefits - Performance measures incorporated into manageable metrics, strategic planning and budgeting processes integrated, identification of best practices in an organization.

Steps and Requirements:

- Identify high-level vision and strategies for achieving the vision.
- Use 4 Balanced Scorecard perspectives (financial, customer, internal processes, and learning and innovation) to translate the vision into a clear set of objectives.
- Translate objectives into clear performance measures at the business unit level.
- Evaluate performance against the scorecard.
- Update and maintain the scorecard.

Bid-to-Goal

Participants – Public agencies

Sponsors – N.A.

Overarching Program Type – Voluntary, service improvement and cost savings planning tool.

Drivers – Improve service delivery using public employee labor-management collaboration.

Goals and Desired Outcomes – Achieve operational savings and level of service modifications that are comparable or better to solutions offered by the private sector.

Benefits – Provides an innovative route to savings and efficiency; rewards ratepayers; retains community control of investments, encourages partnership of participants.

Steps and Requirements:

- Establish a goal reflecting the level of savings needed to be competitive with potential private proposals.
- Determine the scope of work describing the level of service including safety margins desired by the community, in exchange for a service fee.
- Provide a schedule for submitting a jointly signed offering (management and labor) and for accomplishing the savings and performance promised under the MOU.
- Execute a service agreement that is implementation driven and evaluated based on terms and conditions of a detailed service agreement.

Capacity, Management, Operation and Maintenance Programs (CMOM) – <http://epa.gov>

Participants – Municipal sanitary sewer collection systems

Sponsors – US EPA

Overarching Program Type – Tool for evaluating and prioritizing efforts to identify and correct performance-limiting situations in the collections system. In EPA Region 4, CMOM has been incorporated as a regulatory requirement. These requirements have not yet been adopted by EPA overall. In Region 4, as part of the NPDES permit application, permittees must conduct an audit evaluating the CMOM and its compliance with the CMOM general standards.

Drivers – Aging infrastructure, history of inadequate investment in infrastructure maintenance and repair, risks to community of not providing an effective sanitary sewer collection system (sanitary sewer overflows or SSOs)

Goals and Desired Outcomes – Reduced health and environmental risks by increasing the investment in managing, operating and maintaining sanitary sewer collection systems and ensuring adequate capacity is provided (increased investment leads to lowered occurrence of sanitary sewer overflows)

Benefits – Leverage planning required by CMOM for getting budget approval for improvements•

Steps and Requirements

- Provide adequate maintenance facilities and equipment, identify critical parts needed for system operations, maintain an adequate inventory or replacement parts
- Implement and enforce sewer use ordinances or other legally binding documents
- Maintain information management systems that contain timely information for system operation and maintenance
- Provide adequate preventative and routine maintenance, and continually review and update procedures
- Ensure all feasible steps are taken to stop and mitigate the impacts of SSOs and develop an overflow response plan
- Assess current system physical condition
- Determine capacity of current collections system and satellite collection systems to meet base and peak flows, identify measures for providing additional capacity or reducing flows (as necessary to meet peak flows)
- Assess capacity of treatment facility to treat peak flows and maintain compliance with permit requirements, identify measures for providing additional capacity or reducing flows (as necessary to meet peak flows), optimize treatment facility operation
- Ensure proper installation of new sewers and connections and assess their capacity to meet peak flows
- Provide employee training on the CMOM program
- Develop and track performance indicators
- Review and update CMOM program procedures periodically

- Conduct an audit, appropriate to size of system and number of SSOs and submit a report of the audit as part of the NPDES permit application

EPA EMS for Local Government Initiative – <http://epa.gov>

Participants – Local government entities (broader than water / wastewater treatment)

Sponsors – US EPA

Overarching Program Type – Pilot project to assist local governments develop and implement an EMS, ISO certification encouraged but not required

Drivers – Strong management tool to help improve environmental performance, pollution prevention, and regulatory compliance

Goals and Desired Outcomes – Positive effect on environmental performance and compliance

Benefits – Improved environmental awareness, improved environmental performance (reduced impacts), improved efficiency, increased accountability within the agency

Steps and Requirements

- Receive training and technical assistance
- Develop and implement an EMS (see ISO 14001 for EMS development and implementation steps)

General Accounting Standards Board Statement #34 (GASB-34) – <http://www.gasb.org>

Participants – Local government agencies

Sponsors – Governmental Accounting Standards Board (GASB)

Overarching Program Type – Requirement to implement asset management and report asset depreciation

Drivers – See asset management

Goals and Desired Outcomes – See asset management

Benefits – See asset management

Steps and Requirements – See asset management bottom up approach

International Organization of Standardization (ISO) 14001 Environmental Management System Standard - <http://www.iso.org>

Participants – Any private or public sector entities

Sponsors – International Standards Organization

Overarching Program Type – Voluntary, procedures based, environmental management system, third party certification optional

Drivers – Provide an international standard for environmental management

Goals and Desired Outcomes – Support environmental protection and prevent pollution while meeting socioeconomic needs

Benefits – Reduced environmental impacts, integration of environmental management and business functions

Steps and Requirements

- Establish environmental policy
- Identify environmental aspects (activities, products, or services which can interact with the environment)
 - Characterizing waste streams (air, effluent, solid / hazardous waste)
 - Identifying environmental requirements (regulatory and other voluntary commitments)
- Identify environmental impacts associated with those environmental aspects
- Identify which functional units are associated with those impacts

- Set environmental objectives and targets (with associated metrics) for reducing impacts (Note: specific performance objectives and targets, beyond meeting regulatory requirements, are not provided by ISO 14001, but an approach for setting them is.)
- Identify business units or individuals responsible for achieving objectives and targets
- Establish and document procedures to meet targets and objectives and manage environmental impacts
- Measure and evaluate performance against established objectives and targets
- Conduct a management review to ensure overall environmental performance and improvement
- Optional – Apply for third party verification and ISO certification of the EMS

ISO 9002 Quality Management System Standard - <http://www.iso.org>

Note: ISO 9002 is the quality management system standard for organizations that do not carry out design and development (those are covered by 9001) and is appropriate for water and wastewater utilities.

Participants – Any private or public sector entities

Sponsors – International Standards Organization

Overarching Program Type – Voluntary, procedures based, quality management system, third party certification optional

Drivers – Provide an international standard for quality management

Goals and Desired Outcomes – Improved product quality

Benefits – Improved product quality, integration of quality management and business functions

Steps and Requirements

- Establish quality policy and objectives
- Identify quality requirements (Note: Like ISO 14001, specific performance objectives and targets are not provided, but an approach for setting them is)
- Define and document how quality requirements should be met (e.g., establishment of quality plans)
- Set quality procedures
- Measure and evaluate performance against established objectives and targets
- Conduct a management review to ensure overall performance and improvement
- Optional – Apply for third party verification and ISO certification

Malcolm Baldrige National Quality Program - <http://www.quality.nist.gov/index.html>

Participants – Private and public for-profit businesses headquartered in the U.S. (manufacturing, service, and small businesses); and for profit and not-for-profit public, private, and government education and health care organizations.

Sponsor – National Institute of Standards and Technology (NIST)

Overarching Program Type – Voluntary, awards program based on 7 categories of criteria that define, at a high-level, good management practices.

Drivers – Establish a standard of excellence for high-quality management that would help U.S. organizations achieve world-class quality and enhance U.S. competitiveness.

Goals and Desired Outcomes – Continuous improvement in the delivery of products and/or services, greater customer satisfaction and response to stakeholders.

Benefits – Baldrige Award recognition, better employee relations, higher productivity, greater customer satisfaction, increased market share, and improved profitability.

Steps and Requirements

- Companies prepare and submit the eligibility certification and application to examiners who review the applications to determine, based on the 7 categories of award criteria, which applicants will receive site visits.
- Examiners conduct on-site verification and clarification of the application package, review pertinent records and data, and conduct interviews with executives and employees.
- Judges review the site visit reports and application packages and present Award recipient recommendations to the Director of NIST and the Secretary of Commerce.
- Examiners submit feedback reports to each applicant containing descriptions of strengths and opportunities for improvements in each of the 7 categories.
- Secretary of Commerce makes final award determinations.

National Biosolids Partnership (NBP) EMS for Biosolids - <http://www.biosolids.org>

Participants – Wastewater treatment organizations that are responsible for the full biosolids management value chain (e.g., from collections and pretreatment to final biosolids disposition)

Sponsors – National Biosolids Partnership (AMSA, WEF, EPA)

Overarching Program Type – Voluntary, procedure-based environmental management system that incorporates best practices and continuous improvement towards performance goals, independent certification

Drivers – Improve public perceptions of biosolids management practices, especially the land application of biosolids for agricultural purposes

Goals and Desired Outcomes – Increased public acceptance of environmentally sound biosolids management practices

Benefits – NBP recognition, increased public acceptance, institutional memory improved through documentation of procedures, improved operational efficiency

Steps and Requirements

- Establish a biosolids policy that commits the agency to the 10 principles in the Code of Good Practice
- Plan and implement an EMS (identify critical control points and associated environmental impacts, set goals and objectives based on legal/other requirements and public input, establish and document procedures to meet goals and objectives, measure and evaluate performance against established goals and objectives)
- Operate the EMS for 6 months and conduct a self-audit
- Apply for and receive third party verification
- Receive NBP recognition
- Annual cycle of management review, self-audit, corrective actions, reports, third party interim audits
- Re-verification (5 year cycle)

Note: Like the ISO management system standards, the NBP EMS for Biosolids does not dictate specific performance goals and targets. However, the NBP's program requires a commitment, through the "Code of Good Practice", to go beyond regulatory compliance.

Occupational Safety and Health Agency Voluntary Protection Program -

<http://www.osha.gov/oshprogs/vpp/>

Participants – Any private or public sector entities that are regulated by OSHA

Sponsors – OSHA

Overarching Program Type – Voluntary, procedures based, occupational safety and health management system

Drivers – management tool to promote effective occupational safety and health programs

Goals and Desired Outcomes – protect workers from occupational safety and health hazards

Benefits – decreased costs in workmen’s compensation and lost work time, increased production, improved employee morale, reduced employee injury rates, OSHA recognition

Steps and Requirements

- Management and labor statement of commitment
- Develop occupational safety and health policy, goals, and objectives
- Conduct worksite safety analysis
- Establish safety / hazard prevention and control procedures (includes substantial employee involvement requirements)
- Report safety concerns
- Receive OSHA verification of meeting program criteria
- Receive periodic OSHA reassessments (every three years for Star recognition)

Partnership for Safe Water - <http://www.awwa.org/partnership>

Participants – Drinking water utilities providing treated surface water

Sponsors – AWWA, ASDWA, AMWA, NAWC, AWWARF, EPA

Overarching Program Type – Voluntary, performance based, benchmarking and self-assessment

Drivers – Prevent performance problems and increase public confidence in the safety of their drinking water

Goals and Desired Outcomes – Increased drinking water safety through continual improvement in water treatment plant performance. Exceeding Federal regulations for safe drinking water and providing a consistent level of performance

Benefits – Receipt of Partnership recognition, increased self-awareness about treatment capacity and performance levels, data to support capital planning

Steps and Requirements

- Declare commitment
- Collect and submit 12 months of turbidity data to provide a benchmark of utility performance
- Conduct a self-assessment
- Annual cycle of collecting and reporting data, making improvements

QualServe - <http://www.awwa.org/Science/qualserve/qualserv.cfm>

Participants – Water treatment, wastewater treatment, and combined utilities

Sponsors – American Water Works Association (AWWA) and WEF

Overarching Program Type – Voluntary, practice-based, qualitative assessment of procedures and practices through self-assessment and peer-based review

Drivers – Help utilities improve service across the entire scope of its operation

Goals and Desired Outcomes – Continual improvement of service

Benefits – QualServe recognition, increased self-awareness about practices, opportunities for improvement identified through the QualServe process can be leveraged in the capital improvement planning process

Steps and Requirements

- Participate in employee survey
- Provide organizational information for the peer review team (e.g., organizational charts, permit information, planning documents, etc.)
- Meet with peer review team to discuss strengths and opportunities
- Receive peer review report
- Conduct an “out-briefing” to staff on results of the peer review report